REMARKS

Claims 3, 4, 8-14, 16-23 and 48-86 are pending in the subject application, and all of the claims stand rejected. Favorable reconsideration of the application and allowance of all of the pending claims are respectfully requested in view of the following remarks.

As a preliminary matter, the finality of the Office Action of August 27, 2003 is improper. In this Office Action, a new ground of rejection was asserted against claim 48 and its dependent claims, and justification for the finality of the Office Action was that Applicant's amendments necessitated the new ground of rejection. However, claim 48 has never been amended. Since a new ground of rejection is being asserted against claim 48 and claim 48 has not been amended, the rejection and Office Action cannot be made final. In a telephone call to the Examiner on September 8, 2003, this issue was discussed, and the Examiner agreed that the finality of the Office Action was improper and would be withdrawn. A copy of an Interview Summary notifying Applicant in writing that the finality of the Office Action was improper and would be withdrawn is attached. Accordingly, since the Office Action does not stand as final, the Declarations and documentary evidence submitted herewith should be entered and considered at this time.

Claims 3, 4 and 8 stand rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 5,025,261 to Ohta et al. in view of U.S. Patent No. 5,802,492 to DeLorme et al. and U.S. Patent Publication No. 2002/0068,549 to Tendler. Further, dependent claims 9-11 stand rejected in further view of U.S. Patent No. 5,930,729 to Khamis et al., dependent claims 12-14 and 16-22 stand rejected in further view of U.S. Patent No. 5,438,695 to Morimura et al., dependent claim 23 stands rejected in further view of U.S. Patent No. 5,109,399 to Thompson, dependent claims 55-57 stand rejected in further view of U.S. Patent No. 5,774,827 to Smith, Jr. et al., and dependent claims 58 and 59 stand rejected in further view of U.S. Patent No. 5,365,451 to Wang et al.

Claims 48-53 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Ohta in view of Delorme, Tendler, Thompson, U.S. Patent No. 5,703,598 to Emmons, and U.S. Patent

No. 5,479,482 to Grimes. Further dependent claim 54 (54/48) stands rejected as being unpatentable over Ohta in view of Delorme, Tendler and Smith, Jr. (curiously, Emmons and Grimes are not cited against this dependent claim).

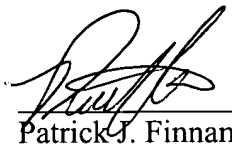
Finally, claims 60-86 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Ohta in view of Delorme, Tendler, Khamis, Morimura, Thompson, Emmons, Grimes, Smith and Wang (ten total documents). Applicant respectfully traverses all of these rejections for the following reasons.

All of these rejections are essentially the same as the previous rejections of the claims, except that Tendler is now additionally relied upon in combination with the previously-cited documents. Applicant submits herewith two Declarations under 37 C.F.R. §1.131, executed by the inventors of the subject application. These Declarations, together with the accompanying supporting documents, establish that the claimed invention was conceived and reduced to practice prior to February 28, 1996 (i.e., prior to the U.S. filing date of the Tendler publication). Accordingly, Tendler does not satisfy the requirements of 35 U.S.C. § 102(e), and cannot be relied upon in any rejection of the claims under 35 U.S.C. §103. Applicant respectfully submits that all of the pending claims would be patentable over the remaining cited documents for the reasons of record stated in previous responses. Since all of the rejections of claims 3, 4, 8-14, 16-23 and 48-86 rely upon Tendler, the Examiner is respectfully requested to withdraw all of these rejections in view of the Declarations.

In view of the foregoing, Applicant respectfully requests the Examiner to find the application to be in condition for allowance with claims 3, 4, 8-14, 16-23 and 48-86. However, if for any reason the Examiner feels that the application is not now in condition for allowance, he is respectfully requested to call the undersigned attorney to discuss any unresolved issues and to expedite the disposition of the application.

Applicant hereby petitions for any extension of time which may be required to maintain the pendency of this case, and any required fee for such extension is to be charged to Deposit Account No. 05-0460.

Respectfully submitted,



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(301) 424-3640

Hand Delivered on: November 26, 2003

Interview Summary

Application No.	Applicant(s)	
09/652,793	GINIGER ET AL.	
Examiner	**Art Unit**	
Charles Chow	2685	

All participants (applicant, applicant's representative, PTO personnel):

(1) *Charles Chow*.

(2) *Patrick Finnan*.

(3)_____.

(4)_____.

Date of Interview: *08 September 2003*.

Type: a)☒ Telephonic b)☐ Video Conference
c)☐ Personal [copy given to: 1)☐ applicant 2)☐ applicant's representative]

Exhibit shown or demonstration conducted: d)☐ Yes e)☒ No.
If Yes, brief description: _____.

Claim(s) discussed: *48*.

Identification of prior art discussed: *N/A.*.

Agreement with respect to the claims f)☒ was reached. g)☐ was not reached. h)☐ N/A.

Substance of Interview including description of the general nature of what was agreed to if an agreement was reached, or any other comments: *The last issued final rejection is incorrect, because claim 48 has not been amended. The final rejection will be withdraw in the next office action.(Fax number: (301)-762-4056)*.

(A fuller description, if necessary, and a copy of the amendments which the examiner agreed would render the claims allowable, if available, must be attached. Also, where no copy of the amendments that would render the claims allowable is available, a summary thereof must be attached.)

THE FORMAL WRITTEN REPLY TO THE LAST OFFICE ACTION MUST INCLUDE THE SUBSTANCE OF THE INTERVIEW. (See MPEP Section 713.04). If a reply to the last Office action has already been filed, APPLICANT IS GIVEN ONE MONTH FROM THIS INTERVIEW DATE, OR THE MAILING DATE OF THIS INTERVIEW SUMMARY FORM, WICHEVER IS LATER, TO FILE A STATEMENT OF THE SUBSTANCE OF THE INTERVIEW. See Summary of Record of Interview requirements on reverse side or on attached sheet.

Examiner Note: You must sign this form unless it is an Attachment to a signed Office action.

Charles Chow 9/8/03
Examiner's signature, if required

Title: Revised Claims

Geotours Specifications

Analog Mobile Unit:
a. Mobile Unit consisting of analog wireless communications module (e.g. analog cellular mobile phone) + position receiver/processing module (e.g. GPS chip set) + logic circuitry that isolates speaker/headset from outgoing position tones
b. Mobile Unit of paragraph a + logic circuitry which initiates receipt/processing of position upon remote request
c. Mobile Unit of paragraph a or b + timing circuitry which triggers refresh of receipt/processing of position on a pre-set or user-defined basis
d. Mobile Unit of paragraph a, b, c, or any combination thereof + timing circuitry which triggers refresh of receipt/processing of position using a time interval specified by a remote party
e. Mobile Unit of paragraph a, b, c, d, or any combination thereof + user-actuated switch for enabling/disabling position reporting function

Digital Mobile Unit:
a. Mobile Unit consisting of digital wireless communications module (e.g. digital cellular or LEO mobile phone) + position receiver/processing module (e.g GPS chip set) + logic circuitry that isolates speaker/headset from outgoing position tones
b. Mobile Unit of paragraph a + logic circuitry which initiates receipt/processing of position upon remote request
c. Mobile Unit of paragraph a or b + timing circuitry which triggers refresh of receipt/processing of position on a pre-set or user-defined basis
d. Mobile Unit of paragraph a, b, c, or any combination thereof + timing circuitry which triggers refresh of receipt/processing of position using a time interval specified by a remote party
e. Mobile Unit of paragraph a, b, c, d, or any combination thereof + user-actuated switch for enabling/disabling position reporting function
f. Mobile Unit of paragraph a, b, c, d, e or any combination thereof + the outgoing position information is encapsulated into data communication protocol packets
g. Mobile Unit of paragraph a, b, c, d, e, f or any combination thereof + a security unit which permits authenticated and confidential exchange of position, user selections, and content
h. Mobile Unit of paragraph g where the security unit holds one or more cryptographic keys, and crypto-engine and where the Mobile Unit and remote system engage in an authentication protocol and encrypt some or all of the exchanged information

Broad Claims:

1. Position-based Information Service:
- Claim 1 describes a Service whereby information is transmitted to the mobile user on the basis of position (obtained in an automated fashion and transparently to the user)

service elements consist of:

a. mobile unit which provides a wireless communications end system for the

user which receives position/location information from a public/private positioning system (in an automated fashion and the operation of which is transparent to the user) that is transmitted to a central site server over the wireless communications link; and which receives voice, data, or multimedia information from the central site server
b. voice, data, or multimedia server(s) at a central site which store(s) and retrieve(s) information for transmission to the mobile unit. The information content selected for transmission at any given time is dependent upon the location of the mobile unit
c. a public/private wireless infrastructure for communicating position/location information from the mobile unit to the central site server and for transmitting voice, data, or multimedia information from the server to the mobile unit
d. a public/private positioning system which provides mobile unit with position/location information

2. Automated Position & User Selection-based Information Service:
- Claim 2 describes a Service whereby information is transmitted to the mobile user on the basis of position (obtained automatically and transparently to user) and on the basis of user-selected information preferences

service elements consist of:

a. Broad Claim #1 paragraph a + The Mobile Unit receives information content/format options from a central site server and transmits the user's selection(s) to the central site server
b. Broad Claim #1 paragraph b + The information content/format selected for transmission at any given time is dependent upon the location of the Mobile Unit and upon the user's content/format preferences received by the server in response to a series of options submitted to the user by the server over the wireless communications link
c. Broad Claim #1 paragraph c + A public/private wireless infrastructure for communicating user content/format selections from the Mobile Unit to the central site server and for transmitting information content/format options to the Mobile Unit
d. Broad Claim #1 paragraph d

3. Secure Automated Position-based Information Service:
- Claim 3 describes a Service whereby information is transmitted in an authenticated and confidential manner to the mobile user on the basis of position (obtained in an automated fashion and transparently to the user)

Broad Claim #1 + Mobile Unit and Central Site Server each holds one or more cryptographic keys and the Mobile Unit and remote system engage in an authentication protocol and encrypt some or all of the exchanged information (including position information and information content)

4. Secure Automated Position and User Selection-based Information Service:
- Claim 4 describes a Service whereby information is transmitted in an authenticated and confidential manner to the mobile user on the basis of position (obtained in an automated fashion and transparently to the user) and on the basis of user-selected information preferences

Broad Claim #2 + Mobile Unit and Central Site Server each possess a cryptographic engine and one or more cryptographic keys and the Mobile Unit and remote system engage in an authentication protocol and encrypt some or all of the exchanged information (including position information user selections, and information content)

Narrower Claims:

Claim 5. Broad Claim #1, #2, #3, or #4 + Central Site sends Mobile Unit a message which initiates receipt/processing of position information by Mobile Unit

Claim 6. Broad Claim #1, #2, #3, or #4 + Mobile Unit initiates its own receipt/processing of position information

Claim 7. Broad Claim #1, #2, #3, #4, Claim #5, or #6 + Central Site provides the Mobile Unit with the time interval for the refresh of position information

Claim 8. Broad Claim #1, #2, #3, #4, Claim #5, or #6 + Mobile Unit uses timing circuitry which triggers refresh of receipt/processing of position on a pre-set or user-defined basis

Claim 9. Broad Claim #1, #2, #3, #4, Claim #5, #6, #7, #8, or any combination thereof + Mobile Unit either:
(a) provides processed position information to Central Site, or
(b) provides raw position information to Central Site and Central Site processes the raw position information in order to derive an actual position, or
(c) provides a reference signal to the positioning system, receives raw position information back from positioning system, and calculates the actual position from the received raw position which it forwards to Central Site, or
(d) provides a reference signal to the positioning system, receives raw position information back from positioning system, forwards the raw position information to the Central Site, and the Central Site processes the raw position information in order to derive an actual position, or
(e) provides a reference signal to the positioning system, receives processed position back from positioning system, and forwards the processed position to the Central Site, or
(f) provides a reference signal to the positioning system, the positioning system sends the raw position information to the Central Site, and the Central Site calculates the actual position the received raw position information, or
(g) provides a reference signal to the positioning system, the positioning system processes the position and sends the actual processed position to the Central Site, and the Central Site

Claim 10. Broad Claim #1, #2, #3, #4, Claim #5, #6, #7, #8, # 9 or any combination thereof + the Central Site contacts an operator, transfers the position information to the operator, and transfers the communications channel to the operator thus enabling the operator to exchange information with the user of the Mobile Unit

Preferred Embodiments

1. Analog Cellular/GPS Position-based Information Service:

service elements consist of:

a. Analog cellular Mobile Unit incorporating GPS (Global Positioning System) receiver/processing module, logic circuitry that isolates speaker/headset from outgoing position tones, logic circuitry which initiates receipt/processing of position upon remote request from central site server, timing circuitry which refreshes position based upon time interval specified by central site server, and a user-activated switch for enabling/disabling position reporting function.

b. Public analog cellular infrastructure over which Mobile Unit and Central Site transmit position information, menu options and selections, and information content

c. GPS positioning system which is accessed by GPS receiver unit in Mobile Unit. Differential GPS may be employed in order to achieve enhanced resolution of the Mobile Unit's position

d. Central site server which updates and stores information content and which selects information for transmission to the Mobile Unit based upon the Mobile Unit's position and the user's preferences as reflected by menu selections.

Operational Sequence:

(see flow chart entitled 'Preferred Embodiment: Analog')

1. User establishes circuit-switched voice connection with central site server by dialing the phone number assigned to the central site using established analog cellular mobile communications networks.
2. Central site server transmits a menu of user preferences to the user of the Mobile Unit
3. User inputs desired menu selections using Mobile Unit's keypad or provides a voice response if speech recognition equipment is available at central site. For the case in which keypad inputs are used, the menu selections are encoded as DTMF tones and transmitted over the analog cellular infrastructure to the Central Site server.
4. Central Site server stores user preferences in the data record associated with the Mobile Unit
5. Central Site server transmits a request to Mobile Unit to initiate receipt/processing of position and includes the time interval for refresh of position
6. Mobile Unit receives and processes GPS position
7. Mobile Unit transmits position over analog cellular network using DTMF tones
8. Central Site server receives position of Mobile Unit and stores position in a data record associated with the Mobile Unit
9. Central Site server uses both Mobile Unit position and user selections as inputs to a Selection/Position Table. The central site server selects information content to send to the Mobile Unit based upon the entries in the Selection/Position Table.

10. Central site transmits the information content to the mobile unit over the analog cellular network
11. Repeat steps 6 - 10: The Mobile Unit periodically refreshes the position information and transmits the updated position to the central site server according to the refresh time interval originally received from the central site server in step 5. The Central site server updates the entries in the Selection/Position Table and retrieves information content based upon the updated entries
12. At completion of information delivery or upon user request, the mobile user is prompted for new/additional user preferences (i.e. GOTO step 2) OR
13. User terminates the position and selection-based session by going 'on hook' -- (i.e. by terminating the phone call)

System Overview
(Applies to Analog & Digital Preferred Embodiments)

Refer to Fig. 1

GPS Satellites: Send position information to mobile unit
Mobile Unit: Provides wireless communications with central site (receives menu selection alternatives from central site server, transmits user selections to central site server, transmits position information to central site server, receives position-based and selection-based information from central site server); receives position information from positioning system (such as GPS satellites)
Cellular Network:

- Analog: public/private analog cellular or satellite network
- Digital: public/private digital cellular, wireless ISDN, or LEO satellite network

Terrestrial Network: Land-based public switched telephone network
Central Site Server: Voice, data, and/or multimedia servers at a central site which store and retrieve selection-based and position-based information
Selection/Position Table: Central Site server uses both Mobile Unit position and user selections as inputs to a Selection/Position Table. The central site server selects information content to send to the Mobile Unit based upon the entries in the Selection/Position Table.

Analog Mobile Unit Components

Refer to Fig. 2A:

GPS Antenna: Wave guide for receipt of wireless GPS position signals
GPS Receiver: Converts GPS inputs from multiple GPS sources into a geographic position; GPS position is reported upon command from Position Refresh Circuitry
Position Refresh Circuitry:

- Instructs GPS Receiver to receive and process position information based upon a predefined time interval or based upon a time interval defined by a remote party and transmitted to the Position Refresh subsystem via the Position Subsystem Interface Module
- Informs Position Subsystem Interface Module of pending position report refresh

Position Reporting Enable/Disable Switch: Instructs Position Subsystem

Interface Module to either suspend or permit position reporting
Speaker/Headset Isolation Circuitry: Enables or disables the transmission of DTMF tones to the speaker/headset based upon receipt of commands from the Position Subsystem Interface Module
Position Subsystem Interface Module:

- Receives initial request from a remote party to initiate position reporting function and requested refresh time interval
- Instructs Position Refresh Circuitry to initiate a position request and provides position refresh time interval to Position Refresh Circuitry
- Receives notification of pending position refresh from Position Refresh Circuitry and instructs Speaker/Headset Isolation Circuitry to disable GPS position DTMF tones from reaching the speaker or headset
- Receives input from Position Reporting Enable/Disable Switch – when user selects disable then Position Subsystem Interface Module commands Position Refresh Circuitry to suspend the transmission of position refresh commands to the GPS Receiver

Dual-Tone Multi-Frequency (DTMF): Converts the position data into analog tones; converts keypad inputs into analog tones
RF Modulator/Demodulator: Modulates outgoing analog signals generated by mobile unit onto cellular carrier radio frequencies; demodulates incoming analog signals from cellular carrier radio frequencies to baseband frequencies used by the mobile unit
Cellular Antenna: Wave guide for transmission and receipt of analog cellular RF signals
Keypad: Telephone keypad
Microphone: Telephone microphone used to transmit audio
Speaker: Telephone speaker used to receive audio
Headset: Device for listening to audio information

Central Site Server

Refer to Fig. 3

Digital Private Branch Exchange (PBX): Central site telephone exchange system that provides access to the public switched telephone network
Voice Response Unit (Analog Cellular): Telephony end point device which accepts mobile unit call set-up requests, which sends audio selection menu to mobile unit, which receives DTMF tones originated by GPS and keypad inputs from mobile units and converts the DTMF tones to digital data format used by the server, and which converts digitally encoded audio data into audio format used by the mobile unit.
Server: Audio (or data/multimedia) server which maintains the selection/position table for each caller and retrieves the appropriate audio narrative (or data/multimedia presentation) from the storage device.
Storage: Storage device for storing and retrieving digitally encoded audio narratives (or data/multimedia presentations).

2. (Digital Cellular or LEO satellite)/GPS Position-based Information Service:

service elements consist of:

a. Digital cellular Mobile Unit incorporating GPS (Global Positioning System) receiver, logic circuitry that isolates speaker/headset from outgoing position tones, logic circuitry which initiates receipt/processing of position upon remote request from central site server, timing circuitry which refreshes position based upon time interval specified by central site server, a user-activated switch for enabling/disabling GPS reporting function, and a security unit which includes a public-key crypto engine, a symmetric key crypto engine, a public/private key pair, and its public key certificate

b. Public digital cellular (or LEO satellite or, in future -- wireless ISDN or other high throughput wireless digital) infrastructure over which Mobile Unit and Central Site transmit position information, menu options and selections, and information content

c. GPS positioning system which is accessed by GPS receiver in Mobile Unit. Differential GPS may be employed in order to achieve enhanced resolution of the Mobile Unit's position

d. Central site server which updates and stores information content and which selects information for transmission to the Mobile Unit based upon the Mobile Unit's position and user preferences as reflected by menu selections. The central site server also possesses a security unit which includes a public-key crypto engine, a public/private key pair, and its public key certificate

Operational Sequence:
(see flow chart entitled 'Preferred Embodiment: Digital')

1. User establishes circuit-switched voice connection with central site server by dialing the phone number assigned to the central site using established digital cellular (or LEO satellite) mobile communications networks.
2. Central site server requests whether user wishes to establish a secure connection
3. User responds with the desired keypad input or voice response if speech recognition equipment is available at central site
If the answer is 'no' then proceed to step 8
If the answer is 'yes' then
4. Server sends its public key certificate to security unit of Mobile Unit and prompts security unit of Mobile Unit for its public key certificate
5. Mobile Unit sends a message which includes a challenge field encrypted using the public key of the central site server and the Mobile Unit's public key certificate
6. Central site server decrypts the challenge field and sends an entitlement message that includes the challenge field and a symmetric 'secret' key. The message is transmitted encrypted using a public key envelope. All subsequent transmissions with Mobile Unit will be encrypted using the symmetric key sent to the Mobile Unit.

7. Mobile Unit's security unit decrypts public key envelope and stores key for use in all future transmissions with central site server for the duration of the call
8. Central site server transmits a menu of user preferences to the user of the Mobile Unit. (Menu is encrypted if user selected secure connection in step 3)
9. User inputs menu selections using keypad of Mobile Unit or by voice responses if speech recognition equipment is available at the central site. Menu selections are transmitted over the digital cellular or LEO infrastructure to the Central Site server. (Menu selections are encrypted if user selected secure connection in step 3)
10. Central Site server stores user preferences in the data record associated with the Mobile Unit. (User preferences are decrypted if user selected secure connection in step 3)
11. Central Site server transmits a request to Mobile Unit to initiate receipt/processing of position and includes the time interval for refresh of position. (Request is encrypted if user selected secure connection in step 3)
12. Mobile Unit receives and processes GPS position
13. Mobile Unit transmits the position over the digital cellular or LEO satellite infrastructure to the central site server. (Server request is decrypted and position is encrypted if user selected secure connection in step 3)
14. Central Site server receives position of Mobile Unit and stores position in a data record associated with the Mobile Unit. (Server decrypts position if user selected secure connection in step 3)
15. Central Site server uses both Mobile Unit position and user selections as inputs to a Selection/Position Table. The central site server selects information content to send to the Mobile Unit based upon the entries in the Selection/Position Table
16. Central site transmits the information to the mobile unit over the digital cellular or LEO satellite network. (Information is encrypted if user selected secure connection in step 3)
17. Repeat steps 12 - 16: The Mobile Unit periodically refreshes the position information and transmits the updated position to the central site server according to the refresh time interval originally received from the central site server in step 11. The Central site server updates the entries in the Selection/Position Table and retrieves information content based upon the updated entries
18. At completion of information delivery or upon user request, the mobile user is prompted for new/additional user preferences (i.e. GOTO step 8) OR
19. User terminates the position and selection-based session by going 'on hook' – (i.e. by terminating the phone call)

System Overview
(see system overview in the analog preferred embodiment section)

Digital Mobile Unit Components

Refer to Fig. 2B:

GPS Antenna: Wave guide for receipt of wireless GPS position signals
GPS Receiver: Converts GPS inputs from multiple GPS sources into a geographic position; GPS position is reported upon command from Position Refresh Circuitry
Position Refresh Circuitry:

- Instructs GPS Receiver to receive and process position information based upon a predefined time interval or based upon a time interval defined by a remote party and transmitted to the Position Refresh subsystem via the Position Subsystem Interface Module
- Informs Position Subsystem Interface Module of pending position report refresh

Position Reporting Enable/Disable Switch: Instructs Position Subsystem Interface Module to either suspend or permit position reporting

Speaker/Headset Isolation Circuitry: Enables or disables the transmission of position reports to the speaker/headset based upon receipt of commands from the Position Subsystem Interface Module

Position Subsystem Interface Module:

- Receives initial request from a remote party to initiate position reporting function and requested refresh time interval
- Instructs Position Refresh Circuitry to initiate a position request and provides position refresh time interval to Position Refresh Circuitry
- Receives notification of pending position refresh from Position Refresh Circuitry and instructs Speaker/Headset Isolation Circuitry to disable GPS position reports from reaching the speaker or headset
- Receives input from Position Reporting Enable/Disable Switch – when user selects disable then Position Subsystem Interface Module commands Position Refresh Circuitry to suspend the transmission of position refresh commands to the GPS Receiver

Data Network Interface: Packetizes the position data; generates addressing for the packets (where necessary)

Multiplexer (MUX): Multiplexes position packets, keypad inputs, and audio inputs for transmission over the cellular network to the central site server; demultiplexes audio originating at the central site server and outputted by the speaker or headset.

RF Modulator/Demodulator: Modulates outgoing digital signals generated by mobile unit onto cellular carrier radio frequencies; demodulates incoming digital audio data from cellular carrier radio frequencies to baseband digital signals used by the mobile unit

Cellular Antenna: Wave guide for transmission and receipt of digital cellular RF signals

Keypad: Telephone keypad

Microphone: Telephone microphone used to transmit audio

Speaker: Telephone speaker used to receive audio

Headset: Device for listening to audio information

Central Site Server

Refer to Fig. 3

Digital Private Branch Exchange (PBX): Central site telephone exchange system that provides access to the public telephone switched network

Voice Response Unit (Digital Cellular): Telephony end point device which accepts mobile unit call set-up requests, which sends audio selection menu to mobile unit, which receives GPS packets and keypad inputs from mobile units, and which converts digitally encoded audio data into digital audio format used by the mobile unit.

Server: Audio (or data/multimedia) server which maintains the selection/position table for each caller and retrieves the appropriate audio narrative (or data/multimedia presentation) from the storage device.
Storage: Storage device for storing and retrieving digitally encoded audio narratives (or data/multimedia presentations).

#13

Geotours Claims

Position-based Information Claims
(Revised to include Scott's suggestions on user-selected information)

Two Broad Claims:
1st claim describes info transmitted on the basis of position and user-selected information category
2nd claim describes info transmitted solely on the basis of position

1. Position-based Information Service:

service elements consist of:

a. mobile unit which provides a wireless communications end system for the user and which receives position/location information from a public/private positioning system that is transmitted to a central site server over the wireless communications link. The mobile unit receives information content/format options from a central site server and transmits the user's selection(s) to the central site server; The mobile unit receives voice, data, or multimedia information from the central site server

b. voice, data, or mulitmedia server(s) at a central site which stores and retrieves information for transmission to the mobile unit. The information content/format selected for transmission at any given time is dependent upon the location of the mobile unit and upon the user's content/format preferences received by the server in response to a series of options submitted to the user by the server over the wirelesss communications link

c. a public/private wireless infrastructure for communicating position/location information and user content/format selections from the mobile unit to the central site server and for transmitting information content/format options and voice, data, or multimedia information from the central site server to the mobile unit

d. a public/private positioning system which provides mobile unit with position/location information

2. Position-based Information Service:

service elements consist of:

a. mobile unit which provides a wireless communications end system for the user which receives position/location information from a public/private positioning system that is transmitted to a central site server over the wireless communications link; and which receives voice, data, or multimedia information from the central site server

b. voice, data, or mulitmedia server(s) at a central site which stores and retrieves information for transmission to the mobile unit. The information content selected for transmission at any given time is dependent upon the location of the mobile unit

c. a public/private wireless infrastructure for communicating position/location information from the mobile unit to the central site server

and for transmitting voice, data, or multimedia information from the server to the mobile unit

d. a public/private positioning system which provides mobile unit with position/location information

---

3. Position-based Information Service:
(mobile unit calculates its own location from received positioning information--if necessary)

service elements consist of:

a. mobile unit which provides a wireless communications end system for the user and receives position/location information from a public/private positioning system, calculates its location from the positioning information (if necessary) and transmits its location to a central site server over the wireless communications link. The mobile unit receives information content/format options from a central site server and transmits the user's selection(s) to the central site server. The mobile unit receives voice, data, or multimedia information from the central site server

b. voice, data, or mulitmedia server(s) at a central site which stores and retrieves information for transmission to the mobile unit. The information content/format selected for transmission at any given time is dependent upon the location of the mobile unit and upon the user's content/format preferences received by the server in response to a series of options submitted to the user by the server over the wirelesss communications link

c. a public/private wireless infrastructure for communicating location information and user content/format selections from the mobile unit to the central site server and for transmitting information content/format options and voice, data, or multimedia information from the central site server to the mobile unit

d. a public/private wireless positioning system which provides mobile unit with positioning information.

4. Position-based Information Service:
(mobile unit receives position information, transmits position information to server, and server calculates mobile unit's location from positioning information -- if necessary)

service elements consist of:

a. mobile unit which provides a wireless communications end system for the user and which receives position information from a public/private positioning system. The mobile unit transmits the positioning information to a central site server over the wireless communications link. The central site server uses the positioning information to calculate the mobile unit's location (if necessary). The mobile unit receives information content/format options from the central site server and transmits the user's selection(s) to the central

site server. The mobile unit receives voice, data, or multimedia information from the central site server

b. voice, data, or mulitmedia server(s) at a central site which stores and retrieves information for transmission to the mobile unit and which calculates the location (if necessary) of mobile units from the positioning information transmitted by the mobile units over the wireless communications link. The information content/format selected for transmission at any given time is dependent upon the location of the mobile unit and upon the user's content/format preferences received by the server in response to a series of options submitted to the user by the server over the wirelesss communications link

c. a public/private wireless infrastructure for communicating position information and user content/format selections from the mobile unit to the central site server and for transmitting information content/format options and voice, data, or multimedia information from the central site server to the mobile unit

d. a public/private positioning system which provides mobile unit with positioning information

5. Position-based Information Service:
(mobile unit provides reference signal to positioning system;
positioning system generates position info and transmits to mobile unit;
mobile unit calculates location and transmits location to central site server)

service elements consist of:

a. mobile unit which provides a wireless communications end system for the user and provides a reference signal for a wireless positioning system. The mobile unit receives positioning information from the positioning system, calculates its location from the positioning information (if required), and transmits its location to a central site server over the wireless communications link. The mobile unit receives information content/format options from the central site server and transmits the user's selection(s) to the central site server. The mobile unit receives voice, data, or multimedia information from the central site server

b. voice, data, or mulitmedia server(s) at a central site which stores and retrieves information for transmission to the mobile unit. The information content/format selected for transmission at any given time is dependent upon the location of the mobile unit and upon the user's content/format preferences received by the server in response to a series of options submitted to the user by the server over the wirelesss communications link

c. a public/private wireless infrastructure for communicating location information and user content/format selections from the mobile unit to the central site server and for transmitting information content/format options and voice, data, or multimedia information from the central site server to the mobile unit

d. a wireless positioning system which generates positioning information with respect to the mobile unit using the mobile unit's reference signal, and transmits the positioning information to the mobile unit

6. Position-based Information Service:
(mobile unit provides reference signal to positioning system;
positioning system generates position info and transmits to mobile unit;
mobile unit transmits positioning info to central site server;
central site server calculates mobile unit's position – if necessary – from positioning info)

service elements consist of:

a. mobile unit which provides a wireless communications end system for the user and provides a reference signal for a wireless positioning system. The mobile unit receives positioning information from the positioning system and transmits the positioning information to a central site server over the wireless communications link. The central site server calculates the mobile unit's location (if necessary) based on the positioning information. The mobile unit receives information content/format options from the central site server and transmits the user's selection(s) to the central site server. The mobile unit receives voice, data, or multimedia information from the central site server

b. voice, data, or mulitmedia server(s) at a central site which stores and retrieves information for transmission to the mobile unit and which calculates the location of mobile units (if necessary) from the positioning information transmitted by the mobile units over the wireless communications link. The information content/format selected for transmission at any given time is dependent upon the location of the mobile unit and upon the user's content/format preferences received by the server in response to a series of options submitted to the user by the server over the wirelesss communications link

c. a public/private wireless infrastructure for communicating position information and user content/format selections from the mobile unit to the central site server and for transmitting information content/format options and voice, data, or multimedia information from the central site server to the mobile unit

d. a wireless positioning system which generates positioning information with respect to the mobile unit using the mobile unit's reference signal, and transmits the positioning information to the mobile unit

7. Position-based Information Service:
(mobile unit provides reference signal to positioning system;
positioning system generates position info and transmits to central site server;
central site server calculates mobile unit's position from positioning info)

service elements consist of:

a. mobile unit which provides a wireless communications end system for the user and provides a reference signal for a wireless positioning system. The mobile unit receives information content/format options from the central site server and transmits the user's selection(s) to the central site server. The

mobile unit receives voice, data, or multimedia information from the central site server

b. voice, data, or mulitmedia server(s) at a central site which stores and retrieves information for transmission to the mobile unit. The information content/format selected for transmission at any given time is dependent upon the location of the mobile unit and upon the user's content/format preferences received by the server in response to a series of options submitted to the user by the server over the wirelesss communications link

c. a public/private wireless infrastructure for communicating user content/format selections from the mobile unit to the central site server and for transmitting information content/format options and voice, data, or multimedia information from the central site server to the mobile unit

d. a wireless positioning system which generates positioning information with respect to the mobile unit using the mobile unit's reference signal, and transmits the positioning information to the central site server over a wireless or land-based infrastructure. The central site server calculates the mobile unit's location from the positioning information (if necessary).

8. Position-based Information Service:
(mobile unit calculates its own location from received positioning information and transmits location to central site server;
central site server contacts operator and transmits location info;
operator converses with user)

service elements consist of:

a. mobile unit which provides a wireless communications end system for the user and receives position/location information from a public/private positioning system, calculates its location from the positioning information (if necessary), and transmits its location to a central site server over the wireless communications link. The mobile unit (optionally) receives information/service options from a central site server and transmits the user's selection(s) to the central site server. The mobile unit receives voice, data, or multimedia information from the central site server and from an operator

b. voice, data, or mulitmedia server(s) at a central site which stores and retrieves information for transmission to the mobile unit and to an operator. The information content selected for transmission at any given time is dependent upon the location of the mobile unit and (optionally) on user selections received by the server in response to a series of emergency options submitted to the user by the server over the wirelesss communications link

c. a public/private wireless infrastructure for communicating location information and (optionally) user content selections from the mobile unit to the central site server and for transmitting information content/service options (optional), and voice, data, or multimedia information from the central site server to the mobile unit. Central site server communicates with operator over public/private circuits (independent of physical transport media).

d. a public/private wireless positioning system which provides mobile

information/service options from a central site server and transmits the user's selection(s) to the central site server. The mobile unit receives audio information from the central site server and from an operator

b. central site server which receives the distress call, uses the positioning information to locate the caller, transfers the caller to an emergency desk operator, and provides the operator and rescue units with graphical (map) displays of the caller's location. The information content selected for transmission to the user at any given time is dependent upon the location of the mobile unit and (optionally) on user selections received by the server in response to a series of emergency options submitted to the user by the server over the wirelesss communications link Information obtained in this fashion is relayed to the operator in data, voice, or graphical form.

c. operator communicates with the user over the satellite/GPS (or cellular/GPS) link, obtains additional information on the nature of the emergency and dispatches rescue units to the scene

Patent Spec (orig.)

Patent Application of
Michael Giniger and W. Scott Hilton

for

A method for providing position related information to mobile devices using wireless communications

Background - Field of Invention

This invention relates to mobile information systems, specifically to information provided to mobile users which is particularly position related andprovided by means of wireless communications.

Background - Description of Prior Art

In the fields of art display, zoology displays, historic and natural displays, industrial demonstration projects, as well as traveler's aide, providers have used various means to provide the observer with additionalinformation relevant to what the observer was viewing and direction as to how to progress through the display or geographic vicinity. The more basic aids have required the user to accompany a tour guide or to read a single or multi-page brochure or informative sign board or to observe and read details in a kiosk or diorama. Others have positioned a fixed device such as a loud speaker broadcasting a sound and word description at one of several locations considered opportune by the curator or provider. Some locations provide a portable device such as a playback device into which the user places an audio tape, compact disk or video tape providing additional information. Still others utilize handcarried receivers which play back a description keyed to a location in the display area or travel area and which are triggered by short rangeIlinfrared or similar unobtrusive technology.

Recognizing the increasing mobility of society and the growing need or quest for concise, rapid, accurate and readily available information, the proprietors of information and entertainment venues, aircraft and automobile manufacturers, electronic equipment providers, and recreational equipment providers have attempted to install or provide access to on-demand information. Providers have come to realize that people prefer on-the-spot information at a time

and place of their own choosing that is relevant to their current location and tailored to their particular interests.

Inventors have created several types of devices and equipments which have attempted to afford the user freedom from interpreting written material. Guided and unguided tours, for instance, employ prepositioned audio and video information which is delivered when the user either pushes a button to announce their presence or sensors detect their approach. Determination of where the listeners or viewers are located is a easily determined because the fixed detector physically senses their presence. Such a system limits the useful information to those positions where the provider can economically or physically position the sensor stations. Users who are proceeding in a vehicle or of necessity continually on the move cannot maintain contact with the fixed information source or the users find they are located at a point where the description is no longer relevant. The quality of the audio or video at fixed stations is dependent on close proximity to the location and tends to deteriorate with continuous usage.

Tour bus and van manufacturers have installed audio and visual devices which can provide position related tour and scenic information keyed to the vehicle's location as determined by the driver or tour guide. Listeners use channel selectors mounted to their seats to select what prerecorded information they will receive in their headsets or monitors. This system provides whatever information the tour company has predetermined to be desired information and is only as pertinent to actual events as the position is updated by the staff or is sequentially keyed to the predicted position of the vehicle.

The General Motors Corporation has announced the introduction of its onboard Guidestar navigation system, which tracks trips on a monitor and talks the driver to any location programmed, available on some its 1995 Oldsmobile 88LS sedans in California, Illinois, Indiana and Michigan. Bottom Line/Personal Newsletter June 15,1995, Vol. 16 No. 12.

Likewise, the Ford Motor Company has announced that at the touch of a button, buyers of the 1996 Lincoln Continental will be able to access a brand-new worldwide emergency tracking system. Its optional Remote Emergency Satellite Cellular Unit (RESCU) uses global positioning satellite technology and the cellular phone network to put

a driver in voice contact with a special response center. The center instantly pinpoints the vehicle's location, guides the appropriate emergency services- roadside assistance, medical, police or fire -to the vehicle, and stays in touch until help arrives. A special password setup protects against false alarms or unauthorized attempts to turn the system off. Better Homes and Gardens, July 1995, p.214.

Inventors who have created individual or personal mobile information systems based on technology such as audio cassette players and compact disc players have provided systems which require the user to know, with some degree of precision, where they are. This information has either been provided by fixed sensors which key the playback device, by sign information which informs the user what geographic information to input, or the position information has to be otherwise determined by the user and keyed into the playback system through an input device such as a keyboard or selection switch. To provide sensors or signs the provider must locate devices which will be limited in number or may be obtrusive to the surroundings. Requiring users unfamiliar with an area to determine their location and key it into the device can be distracting or add an element of danger, particularly if the user is mobile and responsible for the safe direction of a vehicle. Systems which provide a means to determine a position and query a manpack or vehicle mounted information storage device are cumbersome, heavy and a consumer of limited space.

With the advent of universal and accurate navigation systems such as the global positioning system (GPS), the rapid determination of a mobile object or individual's position with high precision has been made possible. Reference maybe made to U.S. Pat. No. 4,114,115 (1979) and its included references. A plurality of artificial satellites are utilized so that at least four observed satellites provide a mobile receiver with a meaningful signal with which to determine orbiting data of each satellite. The present position of each satellite is obtained by applying detected orbit data to solve Kepler's equation. A distance from the mobile object on the ground to each satellite can be obtained by measuring the propagation time of the signal transmitted from the satellite. The mobile receiver's present position is determined by the solution of simultaneous equations of the multiple satellites and the distance between the mobile receiver and each respective observed satellite. The position is displayed to the user as their location at the time of observation.

Such capabilities enable accurate and rapid position determination by people at fixed positions or on the move. This ability would eliminate one of the limitations confronting today's traveler or otherwise mobile person. Withan accurate position, the traveler is not dependent on prepositioned sensors tokey information sources such as those described above. As a result, inventors have been able to devise systems in which the occupant of a mobile vehicle can retrieve information contained on installed cassette tape, compact disk or similar storage device that is based on the accurate GPS position data entered into an onboard computer. Such systems are particularly suited for mobile navigation as employed in U.S. Pat. No. 5,396,254 (1995). It incorporates a position recognition system and an onboard map or location database. While this patented system provides map information generated from an onboard database including the display of the mobile unit's current position and surrounding geographic features, U.S. Pat. No. 5,410,486 (1995) goes further to display onboard generated routing information for locations specified by the operator. Audio instructions derived from an onboard computer processing unit (CPU) is provided to the traveler to effect preselected routing in U.S. Pat. No. 5,406,492(1995) thereby freeing the operator from interpreting visual instructions and pictorial information as required in 486.

The disadvantage in each of these systems is that information is derived from an onboard storage device referring to information which is collected long before the journey is commenced and entered into the computer's mass storage device. The routing guidance and other information is based on static information from the moment it is entered into the database of the onboard system. If the information is of a perishable nature, such as in the nature of highway traffic conditions, construction and repair progress, seasonal availability or cost information, the onboard database is only as good as the last edition attained and loaded by the user. Equally limiting is the scope and breadth of the onboard database. Normally entered into a finite space and capacity, any travel beyond the dimensions of the loaded data is of necessity unsupported by the installed information system.

The limitations suffered by these attempted solutions to the dynamics of a mobile unit and its environment are addressed, to a limited degree, in U.S.Pat. 4,812,843 (1989) to Champion, Libero and Palmer. In its preferred embodiment, this traffic information system permits direct access to information maintained and kept current by

a service provider. Information concerning the current status of traffic conditions along a specific metropolitan commuter routing which is maintained in a high capacity dynamic data base is available on demand. Additional information reports which may be of interest to a subscriber including airline flight and surface travel information as well as stock information may be queried. Subscribers are provided such information by telephone, mobile telephone, or computer.

The limitations of this system include the fact that it is devised to serve a metropolitan subscriber whose interest are essentially traffic conditions, optimum routing given those conditions, connecting travel information as well as commercial data preferred by urban commuters. Additionally, the travel information system requires the subscriber to personally determine own position information and provide it via the input device, whether that be digitally via modem or voice input via a dual tone multiple frequency (DTMF) capable telephone.

The narrow informational spectrum available and the lack of support for individuals not placed in some type of vehicle is apparent. The system is directed toward the mobile vehicle user in an urban traffic setting and does not address the needs of dismounted travelers, historians, researchers, academicians and the like for broad range position)dependent information in urban, rural or remote locations.

Objects and Advantages

Accordingly, the several objects and advantages of the present invention are:

(a) to provide information which is related to the accurate position of the information seeker;

(b) to provide the information with minimal effort by the user to determine the accurate position;

(c) to provide selectable information on a broad range of topics or interests;

(d) to provide information covering a broad geographic area served by mobile communications providers;

(e) to provide such information on a continuous basis at any hour or climatic condition;

(f) to provide information of a dynamic nature centrally maintained to ensure accuracy, completeness and timeliness;

(g) to provide such service to users employing lightweight, highly portable and easily employed equipment;

(h) to provide service extension to third parties in support of emergency and life support actions on behalf of the subscriber;

(i) to provide service to subscribers in a mode requiring minimal visual observation and interpretation;

Further objects and advantages are to provide a informational service which is unobtrusive to those about the user, safely employable, expandable to all areas where wireless communications capability may extend, may be provided to collocated and interested travelers, which is responsive to emergency conditions and supportive of regional or national emergency planning. Still further objects and advantages will become apparent from a consideration of the ensuing description and drawings.

Drawing Figures

In the drawings, closely related figures have the same number but different alphabetic suffixes.

Figs. 1 to 1E show various configurations of the system with respect to the origin of the positional data.

Fig. 2 shows an alternative wireless communications link between a mobile unit and the Central Site Provider.

Fig. 3 shows an extension of the Central Sites information capability to an emergency agency or emergency response unit.

Reference Numerals in Drawings [If the drawings do not include word descripters]

Description - Figs. 1 to 3

A typical embodiment of the present invention is illustrated in Fig. 1. The system has a mobile unit which has the internal capability to receive and manipulate GPS data to determine the unit's own position information. The mobile unit can establish two)way contact with a Central Site Provider over a wireless communications link such as a cellular service which includes a communications base station, extended through a public switched telephone network (PSTN) to a Central Site Provider's private branch exchange (PBX). The Central Sitemaintains voice, data, and multimedia server(s) which store and permit retrieval of information. A Voice Response Unit facilitates the conversion of DTMF tones into data and the merging of other unique indicators for information retrieval destined for a specific user.

Additional embodiments are shown in Figs. 1A, 1B, 1C, 1D, 1E, 2, and 3. In Fig. 1A the position of the mobile unit is determined by the mobile unit from a public /private positioning system other than GPS to be forwarded to the Central Site; in Fig. 1B a mobile unit receives positioning data for forwarding to the Central Site for mobile unit location calculation; in Fig. 1C the mobile unit provides reference signaling to a positioning system which provides positioning data for the mobile unit's calculation of own position; in Fig. 1D the mobile unit provides reference signaling to a positioning system which provides positioning data to mobile unit for delivery to Central Site for Central Site calculation of mobile position; in Fig. 1E the mobile unit provides reference signal to a positioning system which provides positioning data directly to the Central Site for calculation of mobile unit position. In Fig. 2 the mobile unit attains two-way communication with Central Site through switched communications links utilizing satellite links established through geosynchronous or low earth orbit (LEO) satellites; in Fig. 3 the Central Site extends communications, location, and status information received from the mobile unit to emergency agencies or units.

Operation - Figs. 1 to 3

The operator of the mobile unit establishes two)way communications via a cellular voice through a base station and a public switched telephone network tothe Central Site Provider, Fig. 1, or via a switched voice communications link through satellite connectivity, Fig. 2. The mobile unit provides its GPS determined position to the Central Site, Fig. 1, or it provides position or position

determining data from other public/private positioning systems to the Central Site, Figs. 1A to 1D or the public/private positioning system provides position data directly to the Central Site, Fig. 1E.

The Central Site provides the mobile unit operator a menu of user information and service selections. The mobile unit operator selects and communicates the information or service option(s) desired to the Central Site Provider. The Central Site Provider receives the request and positioning information via a PSTN through its PBX and routes it to the Voice Response Unit(VRU). The VRU takes the analog DTMF tones which correspond to the GPS or other position coordinates, converts them to data, adds a channel identifier corresponding to the service/information requested and routes them to the information server.

The server output provides the requested information in the requested medium format, either voice, data or video to the mobile unit through an established communications connectivity. As the mobile unit acquires a new position and new coordinates are provided, the information server retrieves and forwards new and updated information to the mobile unit.

Based upon an emergency request from the mobile unit operator, the Central Site would contact and connect an appropriate agency or unit to provide assistance to the mobile unit's location or where directed, Fig. 3. The Central Site would have the capability to extend voice or data communications to the unit or agency if appropriately equipped and to provide the third party agency or unit with stored information based on the mobile units position if the agency or unit is appropriately equipped to receive the information requested, in the form stored.

From the descriptions above, a number of advantages of our mobile unit information system become evident:

(a) The information available to the user is not dependent on the loading of a storage device on the mobile platform or individual. Wherever the mobile unit is taken, information is available on short notice and effortlessly linked to the mobile unit's location. No agency or establishment had to position a device, sign, literature or sensor in advance of the mobile unit's arrival. Perishable information is updated as events occur and not quickly outdated as is information prepositioned within the mobile unit.

b) The information requested is available year round and at all hours of the day.

(c) The range of information available is broad and can tailored to the desires and needs of the mobile unit operator. Last minute decisions about itineraries and routes are easily accommodated because information is provided as to current position and not a position projected at an earlier date.

(d) The light weight, easily hand carried mobile unit permits ranging where vehicles could not pass or are not permitted. Likewise, emergencies which occur away from a base station or vehicle can be reacted to with vast amounts of pertinent site specific information made rapidly available to responding units or agencies.

Summary, Ramifications and Scope

Accordingly, the reader will see that the informational system of our invention provides the user a easily transportable mobile device which provides wireless access to wide-ranging dynamic information directly related to the system derived positional information. In addition, the information system is highly responsive to acute information and communications needs during ongoing and developing emergency conditions.

Although the description above contains many specifications, these should not be construed as limiting the scope of the invention but as merely providing illustrations of some of the presently preferred embodiments of this invention. For instance, the system will employ other universal positioning information sources; the system can accommodate output devices which are digital or analog including facsimile, x-y plotter etc.

Thus the scope of the invention should be determined by the appended claims and their legal equivalents, rather than by the examples given.

Patent Spec V2

Patent Application of
Michael Giniger and W. Scott Hilton

for

A method for providing position related information to mobile devices using wireless communications

Background - Field of Invention

This invention relates to mobile information systems, and specifically to information provided to mobile users which is based upon the user's position and tailored to the user's interests.

Background - Description of Prior Art

Guided Tours and Pre-positioned Audio and Video:

A variety of methods have been employed for the purpose of presenting observers with information that is related to exhibits (e.g. art displays, zoological displays, etc.) or sights (e.g. tours of historic sights, natural wonders, urban settings, theme parks, etc.) which are in the proximate vicinity of the observer and for guiding or controlling the observer's physical movements through an exhibit, display, or geographic locale. The most common and most widely used presentation and touring methods include:

- Guided tours in which the customer accompanies a tour guide on a walking tour or in a vehicle (e.g. bus, boat, helicopter)
- Personal tours in which the sightseer reads a brochure and follows a map or floor plan,
- Personal tours in which the sightseer reads informative sign boards, or obtains information from a kiosk or diarama,
- Loud speaker broadcasts of information at preselected locations,
- Portable playback devices rented by the sightseer which play an audio tape, compact disk, or video tape,
- Portable receivers rented by the sightseer which trigger short range infrared (or similar technology) transmitters located at various points of the exhibit. and which play back a description keyed to the location of the transmitter.

Recognizing the increasing mobility of society and the growing need and quest for concise, rapid, accurate and readily available

information, the proprietors of information and entertainment venues, aircraft and automobile manufacturers, electronic equipment providers, and recreational equipment providers have attempted to install or provide access to on-demand information. Providers have come to realize that people prefer on-the-spot information at a time and place of their own choosing that is relevant to their current location and tailored to their particular interests.

Inventors have created several types of devices and equipment which have attempted to afford the user freedom from interpreting written material. Guided and unguided tours, for instance, employ prepositioned audio and video information which is delivered when the user either pushes a button to announce his/her presence or triggers sensors designed to detect the user's approach. Such a system readily determines that a viewer is at a particular predefined location however the system is limited in that position-based information is restricted to those locations at which the provider can economically and practically position the sensor stations. Users who are proceeding in a vehicle or are, of necessity, continually on the move either cannot maintain contact with the fixed information source or will quickly find themselves located at a point where the description is no longer relevant. The quality of the audio or video at fixed stations is dependent on close proximity to the location and tends to deteriorate with continuous usage.

Tour bus and van manufacturers have installed audio and visual devices which can provide position related tour and scenic information keyed to the vehicle's location as determined by the driver or tour guide. Listeners use channel selectors mounted to their seats to select what prerecorded information they will receive in their headsets or monitors. This system provides whatever information the tour company has preselected and the staff must either continually correlate the content with the position of the vehicle or prepare a sequential presentation of content that will hopefully match the predicted position of the vehicle.

Sensors or User Inputs that Trigger Information from On-board Storage Devices:

Inventors have created a class of individual and personal mobile information systems based on 'on-board' storage technologies and the use of signs, sensors, and user inputs to establish the current position of the vehicle or individual. The position information

obtained via the fixed sensor, or entered by the individual using a keyboard or selection switch based on external signs, maps, etc. trigger the playback device to output the corresponding audio or visual information stored locally (on-board or on the individual) on an audio cassette, CD ROM, compact disc, or similar storage system. An example of this type of system is the Guidestar navigation system from General Motors which tracks trips on a monitor and talks the driver to any programmed location. The Guidestar navigation system is available on some its 1995 Oldsmobile 88LS sedans in California, Illinois, Indiana and Michigan. Bottom Line/Personal Newsletter June 15,1995, Vol. 16 No. 12.

The drawback to employing systems whose position information is derived from fixed sensors and signs is that they tend to be obtrusive and, as a practical matter, the scope of their coverage is limited to those locations where they may be feasibly and legally placed.

The drawback to on-board systems requiring user involvement in the determination and inputting of current location is that the conduct of these activities may be distracting and even dangerous, particularly if the user is mobile and responsible for the safe control of a vehicle.

GPS location that Triggers Information from On-board Storage Devices:

With the advent of universal and accurate navigation systems such as the global positioning system (GPS), the rapid determination of a mobile object or individual's position with high precision has been made possible. Reference may be made to U.S. Pat. No. 4,114,115 (1979) and its included references. A plurality of artificial satellites are utilized so that at least four observed satellites provide a mobile receiver with a meaningful signal with which to determine orbiting data of each satellite. The present position of each satellite is obtained by applying detected orbit data to solve Kepler's equation. A distance from the mobile object on the ground to each satellite can be obtained by measuring the propagation time of the signal transmitted from the satellite. The mobile receiver's present position is determined by the solution of simultaneous equations of the multiple satellites and the distance between the mobile receiver and each respective observed satellite. The position is displayed to the user as their location at the time of observation.

Such capabilities enable accurate and rapid determination of current position by people at fixed positions or on the move. The advent of this technology means that the traveler need no longer be dependent upon prepositioned sensors or upon the manual determination and inputting of current location to provide the position trigger for information sources such as those described above. As a result, inventors have been able to devise systems in which the occupant of a mobile vehicle can retrieve information contained on installed cassette tape, compact disk or similar storage device that is based on the accurate GPS position data entered into an onboard computer. Such systems are particularly suited for mobile navigation as employed in U.S. Pat. No. 5,396,254 (1995). It incorporates a position recognition system and an onboard map or location database. While this patented system provides map information generated from an onboard database including the display of the mobile unit's current position and surrounding geographic features, U.S. Pat. No. 5,410,486 (1995) goes further to display onboard generated routing information for locations specified by the operator. Audio instructions derived from an onboard computer processing unit (CPU) is provided to the traveler to effect preselected routing in U.S. Pat. No. 5,406,492(1995) thereby freeing the operator from interpreting visual instructions and pictorial information as required in 486.

A personal guidance system for blind pedestrians developed by Jack Loomis, Reginald Golledge, and Roberta Klatzky is described in the April 20, 1995 issue of Technology Review. The system incorporates a GPS monitor, laptop computer, headphones, and associated equipment into a 28 pound backpack unit worn by the blind pedestrian. As the pedestrian walks through an area, the GPS information is used by the computer to retrieve audio information indicating the structures and landmarks in current proximity to the pedestrian.

The disadvantage in each of these systems is that information is derived from an on-board storage device referring to information which is collected long before the journey is commenced and entered into the computer's mass storage device. The routing guidance and other information is based on static information from the moment it is entered into the database of the onboard system. If the information is of a perishable nature, such as in the nature of highway traffic conditions, construction and repair progress, seasonal

availability or cost information, the on-board database is only as good as the most recent edition received and loaded by the user. Equally limiting is the scope and breadth of the onboard database. Normally entered into a finite space and capacity, any travel beyond the dimensions of the loaded data is of necessity unsupported by the installed information system. Furthermore, in the case of the personal guidance system for blind pedestrians, the employment of 'on-board' processing and storage of the information database necessitates that the pedestrian constantly carry the 'on-board' equipment from location to location.

User Inputs that Trigger Information from a Central Data Source:

The limitations suffered by solutions relying on on-board information storage systems are partially addressed in U.S. Pat. 4,812,843 (1989) to Champion, Libero and Palmer. In its preferred embodiment, this traffic information system permits direct access to information maintained and kept current by a service provider. Information concerning the current status of traffic conditions along a specific metropolitan commuter route is maintained in a high capacity dynamic data base and is available to customers on demand. Additional information reports which may be of interest to a subscriber including airline flight and surface travel information as well as stock information may be queried. Subscribers are provided such information by wireline telephone, mobile telephone, or computer.

The employment of a centralized information system which is remotely located from the mobile vehicle removes the local storage limitations and permits the provider to rapidly update the information disseminated to customers. However, the system described in U.S. Patent 4,812,843 requires that subscribers personally determine their current position and provide that position via the input device, whether that be digitally via modem or voice input via a dual tone multiple frequency (DTMF) capable telephone. In addition, the travel information system is geared specifically toward urban vehicular commuters; providing information on traffic conditions and optimum routing given those conditions. The system does not address the needs of pedestrians including tourists, travelers, students, and the local populace in general for a broad range of position-dependent information in urban, rural, or remote locations.

Emergency Service using GPS Position

The Ford Motor Company has announced an approach for providing an emergency service using GPS to locate the current position of a vehicle. At the touch of a button, buyers of the 1996 Lincoln Continental will be able to access a brand-new worldwide emergency tracking system. Its optional Remote Emergency Satellite Cellular Unit (RESCU) uses global positioning satellite technology and the cellular phone network to put a driver in voice contact with an operator at a special response center. The operator at the center pinpoints the vehicle's location, guides the appropriate emergency service to the vehicle, and stays in voice communication with the customer until help arrives. A special password setup protects against false alarms or unauthorized attempts to turn the system off. Better Homes and Gardens, July 1995, p.214.

In essence, the RESCU system provides an enhanced version of the standard 911 emergency call in which the location of the customer is automatically relayed to the emergency center instead of verbally communicated by the customer over the voice circuit. As such, the RESCU system is an emergency service for vehicular customers that utilizes GPS positioning technology. It should be noted, however, that the information content received by the customer is in all relevant aspects identical to that which would be received by a customer using a wireline or cellular phone to make a standard 911 call. In other words, the RESCU system is no more a position-based information system than the average emergency call because the position information is only relevant with respect to the dispatch of emergency personnel and largely unrelated to the information content received by the vehicular customer. Additionally, the RESCU system is designed specifically to serve customers riding in properly equipped automobiles and is not applicable to pedestrians in distress.

Objects and Advantages

Accordingly, the several objects and advantages of the present invention are:

(a) to provide information which is related to the accurate position of the information seeker;

(b) to provide the information with minimal effort by the user to determine the accurate position;

(c) to provide user-selectable information on a broad range of topics or interests;

(d) to provide information covering a broad geographic area served by mobile communications providers;

(e) to provide such information on a continuous basis at any hour or in any climatic condition;

(f) to provide information of a dynamic nature using a fully automated, centrally maintained facility to ensure accuracy, completeness and timeliness;

(g) to provide such service to users (vehicle occupants or pedestrians) using lightweight, highly portable and easily employed equipment;

(h) to provide service extension to third parties in support of emergency and life support actions on behalf of the subscriber;

(i) to provide service to subscribers in a mode requiring minimal visual observation and interpretation;

Further objects and advantages are to provide an informational service which is unobtrusive to the environment surrounding the user, safely employable, expandable to all areas where wireless communications capability may extend, available to collocated and interested travelers, and which is responsive to emergency conditions and supportive of regional or national emergency planning. Still further objects and advantages will become apparent from a consideration of the ensuing description and drawings.

Drawing Figures

Fig. 1 shows an overview of the position-based information system including a mobile unit, a wireless/wireline infrastructure, GPS positioning system, and central site server. The mobile unit is depicted at a particular grid location which is reflected in the Selection/Position Table at the central site

Fig. 2a shows a mobile unit designed to send and receive communications over an analog cellular (or satellite) wireless infrastructure

Fig. 2b shows a mobile unit designed to send and receive communications over a digital cellular (or satellite) wireless infrastructure

Fig. 3 shows a central site which houses the server and associated components for storing information, receiving incoming calls, and retrieving information based upon the selections and position of the caller.

Description - Figs. 1, 2a, 2b, 3

A typical embodiment of the present invention is illustrated in Fig. 1. The system has a mobile unit which has the internal capability to receive and manipulate GPS data to determine the unit's own position information. The mobile unit can establish two-way contact with a Central Site over a wireless communications link such as a cellular (or satellite) service which generally interfaces with the wireline public switched telephone network (PSTN) to a Central Site's private branch exchange (PBX). A Voice Response Unit constitutes the telephony end-point device which accepts mobile unit call set-up requests and which converts either DTMF tones to the server's digital data format (for analog mobile units) or converts digitally encoded data to the server's digital data format (for digital mobile units). The Central Site servers consist of voice, data, and multimedia server(s) which maintain the selection/position tables for each customer and which store and retrieve position-based information from associated mass storage devices.

A more detailed plan for the analog mobile unit is depicted in fig. 2a. The GPS antenna is the wave guide used for the receipt of the wireless GPS position signals. The GPS receiver converts the GPS signal inputs from multiple GPS sources into a geographic position. The dual-tone multi-frequency (DTMF) converts the position data and keypad inputs into analog tones. The RF modulator/demodulator modulates outgoing analog signals onto carrier radio frequencies and demodulates incoming analog signals from carrier radio frequencies to baseband frequencies. The cellular antenna is the wave guide for transmission and receipt of analog RF signals.

A more detailed plan for the digital mobile unit is depicted in fig. 2b. The GPS antenna is the wave guide used for the receipt of the wireless GPS position signals. The GPS receiver converts the GPS signal inputs from multiple GPS sources into a geographic position. The data network interface packetizes the position data and generates addressign for the packets (where necessary) The multiplexer multiplexes position packets, keypad inputs, and audio inputs for transmission over a digital wireless network. The RF modulator/demodulator modulates outgoing digital signals onto carrier radio frequencies and demodulates incoming digital signals from carrier radio frequencies to baseband frequencies. The cellular antenna is the wave guide for transmission and receipt of digital RF signals.

A more detailed plan of the Central Site is depicted in fig. 3. The private branch exchange (PBX) provides access to the public telephone switched network. The voice response unit (VRU) is the telephony end-point device which accepts mobile unit call set-up requests, which sends audio selection menus to mobile units, which converts GPS and keypad input data into the digital format used by the server, and which converts the digitally encoded audio data into the audio format used by the mobile unit. The server maintains a selection/position table for each customer, determines the appropriate audio narrative (or data/multimedia presentation) corresponding to the customer's position and selections, and retrieves the narrative (or presentation) from the storage device. The purpose of the storage device is to load and store audio narratives or data/mulitmedia presentations.

Operation - Figs. 1, 2a, 2b, 3

The operator of the mobile unit establishes two-way communications over either a wireless cellular link or satellite link with the Central Site. In most cases the Central Site will be connected to the terrestrial PSTN and therefore the connection between the mobile unit and the Central Site will traverse both the wireless infrastructure and the wireline PSTN. The mobile unit provides the customer's current GPS-based position to the Central Site over the wireless link. The Central Site provides the mobile unit operator with a menu of user information and service selections over the wireless link. The mobile unit operator selects and communicates the desired information or service option(s) to the

Central Site over the wireless link. The Central Site processes the service selections and sets up a customer selection/position table. The server provides information relating to the user-selected topics in accordance with the user-selected format. The information content provided at any given time is dependent upon the position of the mobile unit as determined from the GPS data and reflected in the customer's selection/position table. The earliest embodiment will provide audio information to the mobile unit however subsequent embodiments will provide data, video, or multimedia presentations to the mobile unit. As the mobile unit acquires a new position and new coordinates are provided to the Central Site, the server updates the selection/position table, retrieves the information pertaining to the user-selected topics that is associated with the new position, and transmits the position-based information to the mobile unit.

An additional operational embodiment provides a universal emergency response capability to the position-based information system. Based upon an emergency request from the mobile unit, the Central Site contacts an emergency operations center and transmits the location of the mobile unit to the emergency center. The Central Site also forwards the connection with the mobile unit to the emergency operations center in order to permit two-way real-time communication between the customer and the emergency center and to provide continuous updates of the customer's position. This system is applicable to pedestrians as well as customers riding in vehicles.

From the descriptions above, a number of advantages of our mobile unit information system become evident:

(a) The information available to the user is not dependent on the loading of a storage device on the mobile platform or individual. Wherever the mobile unit is taken, information is available on short notice and effortlessly linked to the mobile unit's location. No agency or establishment had to position a device, sign, literature or sensor in advance of the mobile unit's arrival. Perishable information is updated as events occur and not quickly outdated as is information prepositioned within the mobile unit.

b) The information requested is available year round and at all hours of the day.

(c) The range of information available is broad and can be tailored to the desires and needs of the mobile unit operator. Last minute decisions about itineraries and routes are easily accommodated because information is provided as to current position and not a position projected at an earlier date.

(d) The light weight, easily hand carried mobile unit permits ranging where vehicles could not pass or are not permitted. Likewise, emergencies which occur away from a base station or vehicle can be reacted to with vast amounts of pertinent site specific information made rapidly available to responding units or agencies.

Summary, Ramifications and Scope

Accordingly, the reader will see that the informational system of our invention provides the user with an easily transportable mobile device which provides wireless access to wide-ranging dynamic information directly related to the system derived position information. In addition, the information system is highly responsive to acute information and communications needs during ongoing and developing emergency conditions.

Although the description above contains many specifications, these should not be construed as limiting the scope of the invention but as merely providing illustrations of some of the presently preferred embodiments of this invention. For instance, the system will employ other universal positioning information sources; the system can accommodate output devices which are digital or analog including facsimile, x-y plotter etc.

Thus the scope of the invention should be determined by the appended claims and their legal equivalents, rather than by the examples given.

Patent Spec V3

Patent Application of
Michael Giniger and W. Scott Hilton

for

A method for providing position related information to mobile devices using wireless communications

Background - Field of Invention

This invention relates to mobile information systems, and specifically to information provided to mobile users which is based upon the user's position and tailored to the user's interests.

Background - Description of Prior Art

Guided Tours and Pre-positioned Audio and Video:

A variety of methods have been employed for the purpose of presenting observers with information that is related to exhibits (e.g. art displays, zoological displays, etc.) or sights (e.g. tours of historic sights, natural wonders, urban settings, theme parks, etc.) which are in the proximate vicinity of the observer and for guiding or controlling the observer's physical movements through an exhibit, display, or geographic locale. The most common and most widely used presentation and touring methods include:

- Guided tours in which the customer accompanies a tour guide on a walking tour or in a vehicle (e.g. bus, boat, helicopter)
- Personal tours in which the sightseer reads a brochure and follows a map or floor plan,
- Personal tours in which the sightseer reads informative sign boards, or obtains information from a kiosk or diarama,
- Loud speaker broadcasts of information at preselected locations,
- Portable playback devices rented by the sightseer which play an audio tape, compact disk, or video tape,
- Portable receivers rented by the sightseer which trigger short range infrared (or similar technology) transmitters located at various points of the exhibit. and which play back a description keyed to the location of the transmitter.

Recognizing the increasing mobility of society and the growing need and quest for concise, rapid, accurate and readily available

information, the proprietors of information and entertainment venues, aircraft and automobile manufacturers, electronic equipment providers, and recreational equipment providers have attempted to install or provide access to on-demand information. Providers have come to realize that people prefer on-the-spot information at a time and place of their own choosing that is relevant to their current location and tailored to their particular interests.

Inventors have created several types of devices and equipment which have attempted to afford the user freedom from interpreting written material. Guided and unguided tours, for instance, employ prepositioned audio and video information which is delivered when the user either pushes a button to announce his/her presence or triggers sensors designed to detect the user's approach. Such a system readily determines that a viewer is at a particular predefined location however the system is limited in that position-based information is restricted to those locations at which the provider can economically and practically position the sensor stations. Users who are proceeding in a vehicle or are, of necessity, continually on the move either cannot maintain contact with the fixed information source or will quickly find themselves located at a point where the description is no longer relevant. The quality of the audio or video at fixed stations is dependent on close proximity to the location and tends to deteriorate with continuous usage.

Tour bus and van manufacturers have installed audio and visual devices which can provide position related tour and scenic information keyed to the vehicle's location as determined by the driver or tour guide. Listeners use channel selectors mounted to their seats to select what prerecorded information they will receive in their headsets or monitors. This system provides whatever information the tour company has preselected and the staff must either continually correlate the content with the position of the vehicle or prepare a sequential presentation of content that will hopefully match the predicted position of the vehicle.

Sensors or User Inputs that Trigger Information from On-board Storage Devices:

Inventors have created a class of individual and personal mobile information systems based on 'on-board' storage technologies and the use of signs, sensors, and user inputs to establish the current position of the vehicle or individual. The position information

obtained via the fixed sensor, or entered by the individual using a keyboard or selection switch based on external signs, maps, etc. trigger the playback device to output the corresponding audio or visual information stored locally (on-board or on the individual) on an audio cassette, CD ROM, compact disc, or similar storage system.

The drawback to employing systems whose position information is derived from fixed sensors and signs is that they tend to be obtrusive and, as a practical matter, the scope of their coverage is limited to those locations where they may be feasibly and legally placed.

The drawback to on-board systems requiring user involvement in the determination and inputting of current location is that the conduct of these activities may be distracting and even dangerous, particularly if the user is mobile and responsible for the safe control of a vehicle.

GPS location that Triggers Information from On-board Storage Devices:

With the advent of universal and accurate navigation systems such as the global positioning system (GPS), the rapid determination of a mobile object or individual's position with high precision has been made possible. Reference may be made to U.S. Pat. No. 4,114,115 (1979) and its included references. A plurality of artificial satellites are utilized so that at least four observed satellites provide a mobile receiver with a meaningful signal with which to determine orbiting data of each satellite. The present position of each satellite is obtained by applying detected orbit data to solve Kepler's equation. A distance from the mobile object on the ground to each satellite can be obtained by measuring the propagation time of the signal transmitted from the satellite. The mobile receiver's present position is determined by the solution of simultaneous equations of the multiple satellites and the distance between the mobile receiver and each respective observed satellite. The position is displayed to the user as their location at the time of observation.

Such capabilities enable accurate and rapid determination of current position by people at fixed positions or on the move. The advent of this technology means that the traveler need no longer be dependent upon prepositioned sensors or upon the manual determination and inputting of current location to provide the

position trigger for information sources such as those described above. As a result, inventors have been able to devise systems in which the occupant of a mobile vehicle can retrieve information contained on installed cassette tape, compact disk or similar storage device that is based on the accurate GPS position data entered into an onboard computer. Such systems are particularly suited for mobile navigation as employed in U.S. Pat. No. 5,396,254 (1995). It incorporates a position recognition system and an onboard map or location database. While this patented system provides map information generated from an onboard database including the display of the mobile unit's current position and surrounding geographic features, U.S. Pat. No. 5,410,486 (1995) goes further to display onboard generated routing information for locations specified by the operator. Audio instructions derived from an onboard computer processing unit (CPU) is provided to the traveler to effect preselected routing in U.S. Pat. No. 5,406,492(1995) thereby freeing the operator from interpreting visual instructions and pictorial information as required in 486.

A personal guidance system for blind pedestrians developed by Jack Loomis, Reginald Golledge, and Roberta Klatzky is described in the April 20, 1995 issue of Technology Review. The system incorporates a GPS monitor, laptop computer, headphones, and associated equipment into a 28 pound backpack unit worn by the blind pedestrian. As the pedestrian walks through an area, the GPS information is used by the computer to retrieve audio information indicating the structures and landmarks in current proximity to the pedestrian.

The disadvantage in each of these systems is that information is derived from an on-board storage device referring to information which is collected long before the journey is commenced and entered into the computer's mass storage device. The routing guidance and other information is based on static information from the moment it is entered into the database of the onboard system. If the information is of a perishable nature, such as in the nature of highway traffic conditions, construction and repair progress, seasonal availability or cost information, the on-board database is only as good as the most recent edition received and loaded by the user. Equally limiting is the scope and breadth of the onboard database. Normally entered into a finite space and capacity, any travel beyond the dimensions of the loaded data is of necessity unsupported by the installed information system. Furthermore, in the case of the

personal guidance system for blind pedestrians, the employment of 'on-board' processing and storage of the information database necessitates that the pedestrian constantly carry the 'on-board' equipment from location to location.

User Inputs that Trigger Information from a Central Data Source:

The limitations suffered by solutions relying on on-board information storage systems are partially addressed in U.S. Pat. 4,812,843 (1989) to Champion, Libero and Palmer. In its preferred embodiment, this traffic information system permits direct access to information maintained and kept current by a service provider. Information concerning the current status of traffic conditions along a specific metropolitan commuter route is maintained in a high capacity dynamic data base and is available to customers on demand. Additional information reports which may be of interest to a subscriber including airline flight and surface travel information as well as stock information may be queried. Subscribers are provided such information by wireline telephone, mobile telephone, or computer.

The employment of a centralized information system which is remotely located from the mobile vehicle removes the local storage limitations and permits the provider to rapidly update the information disseminated to customers. However, the system described in U.S. Patent 4,812,843 requires that subscribers personally determine their current position and provide that position via the input device, whether that be digitally via modem or voice input via a dual tone multiple frequency (DTMF) capable telephone. In addition, the travel information system is geared specifically toward urban vehicular commuters; providing information on traffic conditions and optimum routing given those conditions. The system does not address the needs of pedestrians including tourists, travelers, students, and the local populace in general for a broad range of position-dependent information in urban, rural, or remote locations.

Emergency Service using GPS Position

The Ford Motor Company has announced an approach for providing an emergency service using GPS to locate the current position of a vehicle. At the touch of a button, buyers of the 1996 Lincoln Continental will be able to access a brand-new worldwide

emergency tracking system. Its optional Remote Emergency Satellite Cellular Unit (RESCU) uses global positioning satellite technology and the cellular phone network to put a driver in voice contact with an operator at a special response center. The operator at the center pinpoints the vehicle's location, guides the appropriate emergency service to the vehicle, and stays in voice communication with the customer until help arrives. A special password setup protects against false alarms or unauthorized attempts to turn the system off. Better Homes and Gardens, July 1995, p.214.

In essence, the RESCU system provides an enhanced version of the standard 911 emergency call in which the location of the customer is automatically relayed to the emergency center instead of verbally communicated by the customer over the voice circuit. As such, the RESCU system is an emergency service for vehicular customers that utilizes GPS positioning technology. It should be noted, however, that the information content received by the customer is in all relevant aspects identical to that which would be received by a customer using a wireline or cellular phone to make a standard 911 call. The position information is only relevant with respect to the dispatch of emergency personnel and largely unrelated to the information content received by the vehicular customer. Additionally, the RESCU system is designed specifically to serve customers riding in properly equipped automobiles and is not applicable to pedestrians in distress.

Objects and Advantages

Accordingly, the several objects and advantages of the present invention are:

(a) to provide information which is related to the accurate position of the information seeker;

(b) to provide the information with minimal effort by the user to determine the accurate position;

(c) to provide user-selectable information on a broad range of topics or interests;

(d) to provide information covering a broad geographic area served by mobile communications providers;

(e) to provide such information on a continuous basis at any hour or in any climatic condition;

(f) to provide information of a dynamic nature using a fully automated, centrally maintained facility to ensure accuracy, completeness and timeliness;

(g) to provide such service to users (vehicle occupants or pedestrians) using lightweight, highly portable and easily employed equipment;

(h) to provide service extension to third parties in support of emergency and life support actions on behalf of the subscriber;

(i) to provide service to subscribers in a mode requiring minimal visual observation and interpretation;

Further objects and advantages are to provide an informational service which is unobtrusive to the environment surrounding the user, safely employable, expandable to all areas where wireless communications capability may extend, available to collocated and interested travelers, and which is responsive to emergency conditions and supportive of regional or national emergency planning. Still further objects and advantages will become apparent from a consideration of the ensuing description and drawings.

Drawing Figures

Fig. 1 shows an overview of the position-based information system including a mobile unit, a wireless/wireline infrastructure, GPS positioning system, and central site server. The mobile unit is depicted at a particular grid location which is reflected in the Selection/Position Table at the central site

Fig. 2a shows a mobile unit designed to send and receive communications over an analog cellular (or satellite) wireless infrastructure

Fig. 2b shows a mobile unit designed to send and receive communications over a digital cellular (or satellite) wireless infrastructure

Fig. 3 shows a central site which houses the server and associated components for storing information, receiving incoming calls, and retrieving information based upon the selections and position of the caller.

Description - Figs. 1, 2a, 2b, 3

A typical embodiment of the present invention is illustrated in Fig. 1. The system has a mobile unit which has the internal capability to receive and manipulate GPS data to determine the unit's own position information. The mobile unit can establish two-way contact with a Central Site over a wireless communications link such as a cellular (or satellite) service which generally interfaces with the wireline public switched telephone network (PSTN) to a Central Site's private branch exchange (PBX). A Voice Response Unit constitutes the telephony end-point device which accepts mobile unit call set-up requests and which converts either DTMF tones to the server's digital data format (for analog mobile units) or converts digitally encoded data to the server's digital data format (for digital mobile units). The Central Site servers consist of voice, data, and multimedia server(s) which maintain the selection/position tables for each customer and which store and retrieve position-based information from associated mass storage devices.

A more detailed plan for the analog mobile unit is depicted in fig. 2a. The GPS antenna is the wave guide used for the receipt of the wireless GPS position signals. The GPS receiver converts the GPS signal inputs from multiple GPS sources into a geographic position. The dual-tone multi-frequency (DTMF) converts the position data and keypad inputs into analog tones. The RF modulator/demodulator modulates outgoing analog signals onto carrier radio frequencies and demodulates incoming analog signals from carrier radio frequencies to baseband frequencies. The cellular antenna is the wave guide for transmission and receipt of analog RF signals.

A more detailed plan for the digital mobile unit is depicted in fig. 2b. The GPS antenna is the wave guide used for the receipt of the wireless GPS position signals. The GPS receiver converts the GPS signal inputs from multiple GPS sources into a geographic position. The data network interface packetizes the position data and generates addressign for the packets (where necessary) The multiplexer multiplexes position packets, keypad inputs, and audio inputs for transmission over a digital wireless network. The RF

modulator/demodulator modulates outgoing digital signals onto carrier radio frequencies and demodulates incoming digital signals from carrier radio frequencies to baseband frequencies. The cellular antenna is the wave guide for transmission and receipt of digital RF signals.

A more detailed plan of the Central Site is depicted in fig. 3. The private branch exchange (PBX) provides access to the public telephone switched network. The voice response unit (VRU) is the telephony end-point device which accepts mobile unit call set-up requests, which sends audio selection menus to mobile units, which converts GPS and keypad input data into the digital format used by the server, and which converts the digitally encoded audio data into the audio format used by the mobile unit. The server maintains a selection/position table for each customer, determines the appropriate audio narrative (or data/multimedia presentation) corresponding to the customer's position and selections, and retrieves the narrative (or presentation) from the storage device. The purpose of the storage device is to load and store audio narratives or data/mulitmedia presentations.

Operation - Figs. 1, 2a, 2b, 3

The operator of the mobile unit establishes two-way communications over either a wireless cellular link or satellite link with the Central Site. In most cases the Central Site will be connected to the terrestrial PSTN and therefore the connection between the mobile unit and the Central Site will traverse both the wireless infrastructure and the wireline PSTN. The mobile unit provides the customer's current GPS-based position to the Central Site over the wireless link. The Central Site provides the mobile unit operator with a menu of user information and service selections over the wireless link. The mobile unit operator selects and communicates the desired information or service option(s) to the Central Site over the wireless link. The Central Site processes the service selections and sets up a customer selection/position table. The server provides information relating to the user-selected topics in accordance with the user-selected format. The information content provided at any given time is dependent upon the position of the mobile unit as determined from the GPS data and reflected in the customer's selection/position table. The earliest embodiment will provide audio information to the mobile unit however subsequent embodiments will provide data, video, or multimedia presentations

to the mobile unit. As the mobile unit acquires a new position and new coordinates are provided to the Central Site, the server updates the selection/position table, retrieves the information pertaining to the user-selected topics that is associated with the new position, and transmits the position-based information to the mobile unit.

An additional operational embodiment provides a universal emergency response capability to the position-based information system. Based upon an emergency request from the mobile unit, the Central Site contacts an emergency operations center and transmits the location of the mobile unit to the emergency center. The Central Site also forwards the connection with the mobile unit to the emergency operations center in order to permit two-way real-time communication between the customer and the emergency center and to provide continuous updates of the customer's position. This system is applicable to pedestrians as well as customers riding in vehicles.

From the descriptions above, a number of advantages of our mobile unit information system become evident:

(a) The information available to the user is not dependent on the loading of a storage device on the mobile platform or individual. Wherever the mobile unit is taken, information is available on short notice and effortlessly linked to the mobile unit's location. No agency or establishment had to position a device, sign, literature or sensor in advance of the mobile unit's arrival. Perishable information is updated as events occur and not quickly outdated as is information prepositioned within the mobile unit.

b) The information requested is available year round and at all hours of the day.

(c) The range of information available is broad and can be tailored to the desires and needs of the mobile unit operator. Last minute decisions about itineraries and routes are easily accommodated because information is provided as to current position and not a position projected at an earlier date.

(d) The light weight, easily hand carried mobile unit permits ranging where vehicles could not pass or are not permitted. Likewise, emergencies which occur away from a base station or vehicle can be

reacted to with vast amounts of pertinent site specific information made rapidly available to responding units or agencies.

Summary, Ramifications and Scope

Accordingly, the reader will see that the informational system of our invention provides the user with an easily transportable mobile device which provides wireless access to wide-ranging dynamic information directly related to the system derived position information. In addition, the information system is highly responsive to acute information and communications needs during ongoing and developing emergency conditions.

Although the description above contains many specifications, these should not be construed as limiting the scope of the invention but as merely providing illustrations of some of the presently preferred embodiments of this invention. For instance, the system will employ other universal positioning information sources; the system can accommodate output devices which are digital or analog including facsimile, x-y plotter etc.

Thus the scope of the invention should be determined by the appended claims and their legal equivalents, rather than by the examples given.

Definition of Elements (slides)

Definition of Functional Elements

Preferred Embodiment

Figure 1: Overview
GPS Satellite: Sends position information to mobile unit
Mobile Unit: Provides wireless communications with central site (receives menu selection alternatives from central site server, transmits user selections to central site server, transmits position information to central site server, receives position-based and selection-based information from central site server); receives position information from positioning system (such as GPS satellites)
Cellular Network: Analog or digital public/private cellular network
Terrestrial Network: Land-based public switched telephone network
Central Site Server: Voice, data, and multimedia servers at a central site which store and retrieve selection-based and position-based information
Selection/Position Table: The information provided to the mobile unit is determined by the current position of the mobile unit and the categories of interest selected by the user of the mobile unit.

Figure 2a: Mobile Unit for Analog Cellular Infrastructure
GPS Antenna: Wave guide for receipt of wireless GPS position signals
GPS Receiver: Converts GPS inputs from multiple GPS sources into a geographic position
Dual-Tone Multi-Frequency (DTMF): Converts the position data into analog tones; converts keypad inputs into analog tones
RF Modulator/Demodulator: Modulates outgoing analog signals generated by mobile unit onto cellular carrier radio frequencies; demodulates incoming analog signals from cellular carrier radio frequencies to baseband frequencies used by the mobile unit
Cellular Antenna: Wave guide for transmission and receipt of analog cellular RF signals
Keypad: Telephone keypad
Microphone: Telephone microphone used to transmit audio
Speaker: Telephone speaker used to receive audio
Headset: Device for listening to audio information

Figure 2b: Mobile Unit for Digital Cellular Infrastructure
GPS Antenna: Wave guide for receipt of wireless GPS position signals
GPS Receiver: Converts GPS inputs from multiple GPS sources into a geographic position
Data Network Interface: Packetizes the position data; generates addressing for the packets (where necessary)
Multiplexer (MUX): Multiplexes position packets, keypad inputs, and audio inputs for transmission over the cellular network to the central site server; demultiplexes audio originating at the central site server and outputted by the speaker or headset.
RF Modulator/Demodulator: Modulates outgoing digital signals generated by mobile unit onto cellular carrier radio frequencies; demodulates incoming digital audio data from cellular carrier radio frequencies to baseband digital signals used by the mobile unit

Cellular Antenna: Wave guide for transmission and receipt of digital cellular RF signals
Keypad: Telephone keypad
Microphone: Telephone microphone used to transmit audio
Speaker: Telephone speaker used to receive audio
Headset: Device for listening to audio information

3. Central Site Server
Digital Private Branch Exchange (PBX): Central site telephone exchange system that provides access to the public telephone switched network
Voice Response Unit (Analog Cellular): Telephony end point device which accepts mobile unit call set-up requests, which sends audio selection menu to mobile unit, which receives DTMF tones originated by GPS and keypad inputs from mobile units and converts the DTMF tones to digital data format used by the server, and which converts digitally encoded audio data into audio format used by the mobile unit.
Voice Response Unit (Digital Cellular): Telephony end point device which accepts mobile unit call set-up requests, which sends audio selection menu to mobile unit, which receives GPS packets and keypad inputs from mobile units, and which converts digitally encoded audio data into digital audio format used by the mobile unit.
Server: Audio (or data/multimedia) server which maintains the selection/position table for each caller and retrieves the appropriate audio narrative (or data/multimedia presentation) from the storage device.
Storage: Storage device for storing and retrieving digitally encoded audio narratives (or data/multimedia presentations).

Summary of Claims

Summary of Claims

Two Broad Claims
1. Position-based and user-selectable information
2. Position-based information

Four Elements
Positioning System
Wireless Communications Infrastructure
Mobile Unit
Central Site Server

Position Calculation/Determination Alternatives
A. Mobile unit calculates location from received positioning data
B. Mobile unit forwards raw position data to server; server calculates location of mobile unit
C. Mobile unit provides reference signal to positioning system; mobile unit calculates location from received positioning data
D. Mobile unit provides reference signal to positioning system; mobile unit forwards raw position data to server; server calculates location to mobile unit

Wireless Communications Alternatives
A. Analog Cellular
B. Digital Cellular
C. Satellite (Low Earth Orbit and Geosynchronous)

Central Site Server
Digital Private Branch Exchange (PBX), Voice Response Unit (VRU), Server, Storage device

Mobile Unit
A. Analog Cellular (or satellite) mobile unit: Dual Tone MultiFrequency (DTMF)
B. Digital Cellular (or satellite) mobile unit: Data Network Interface, Mux

Search & Rescue (Emergency)
- Mobile unit calculates location from received positioning data
- Central site server contacts operator; transmits location to operator; transfers voice channel to operator

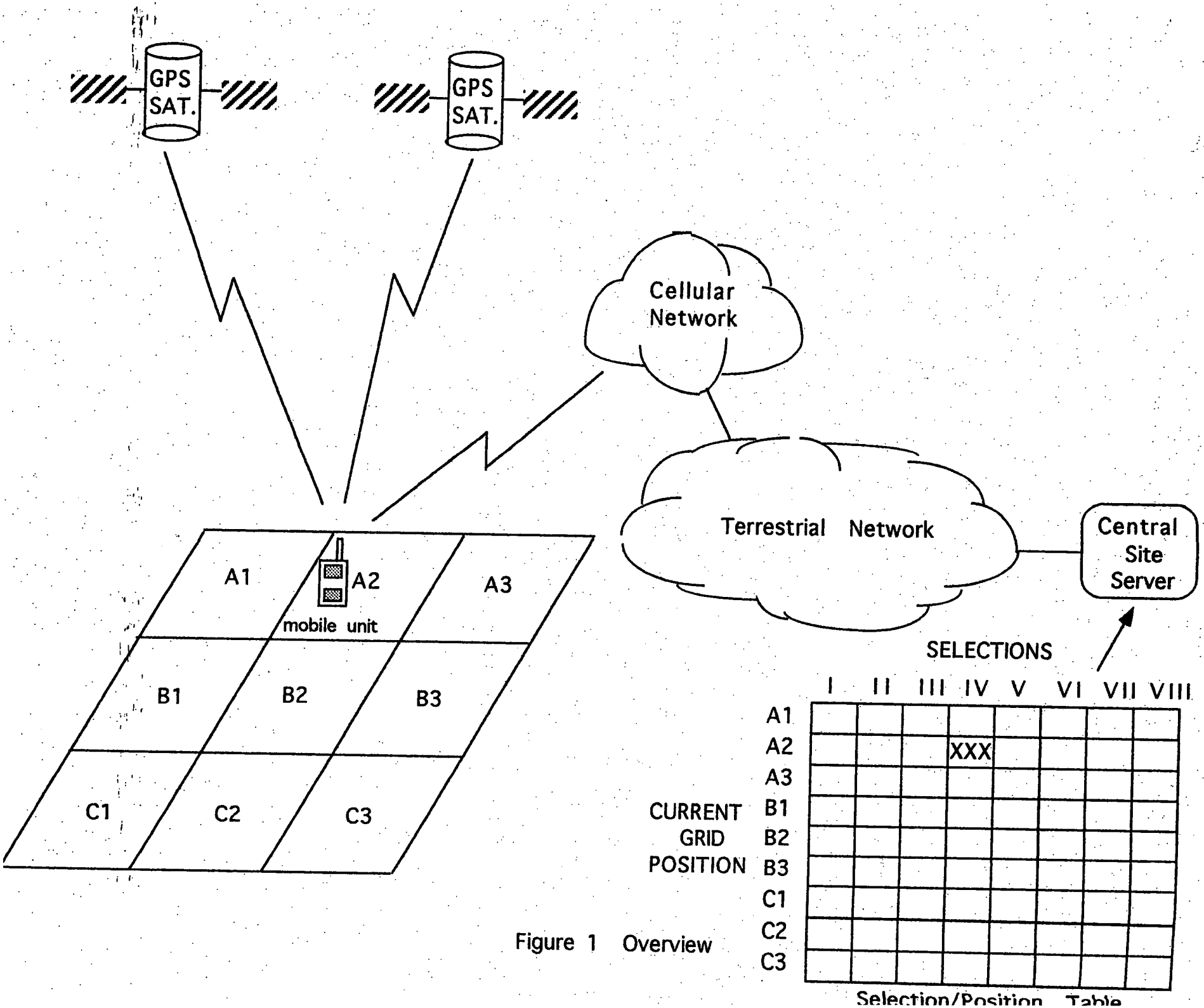

Figure 1 Overview

1. Overview

2a. mobile unit - analog (Pict)

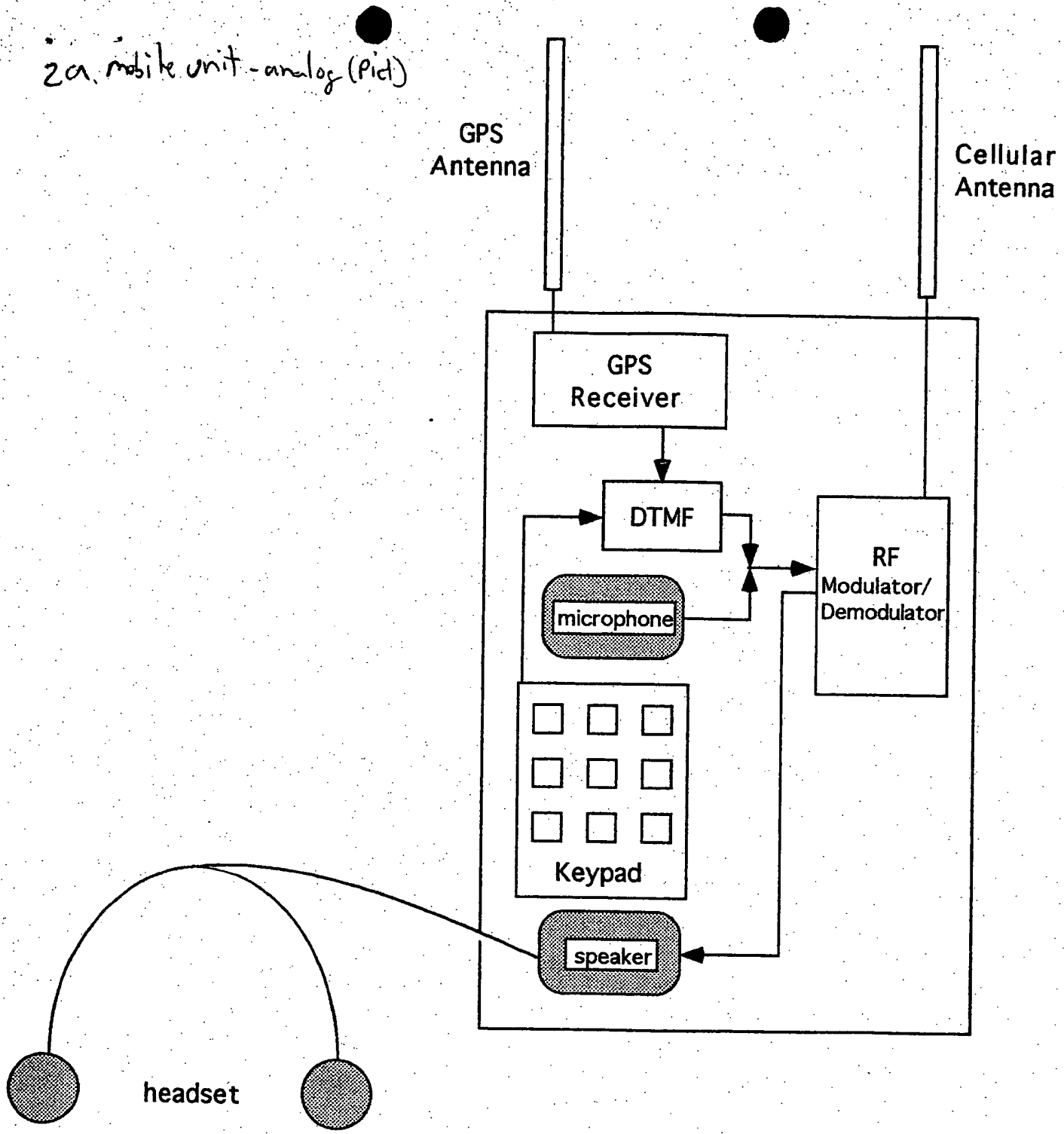

Figure 2a Mobile Unit for Analog Cellular or Satellite Infrastruct

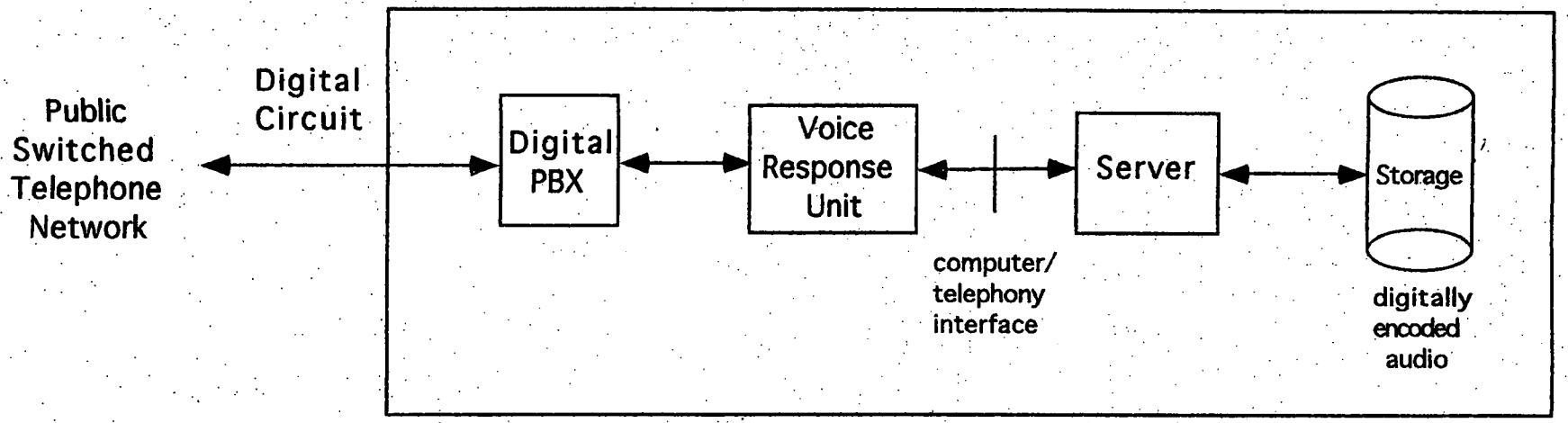

Figure 3 Central Site Server (PICT)

3. Central Site Server (PICT)

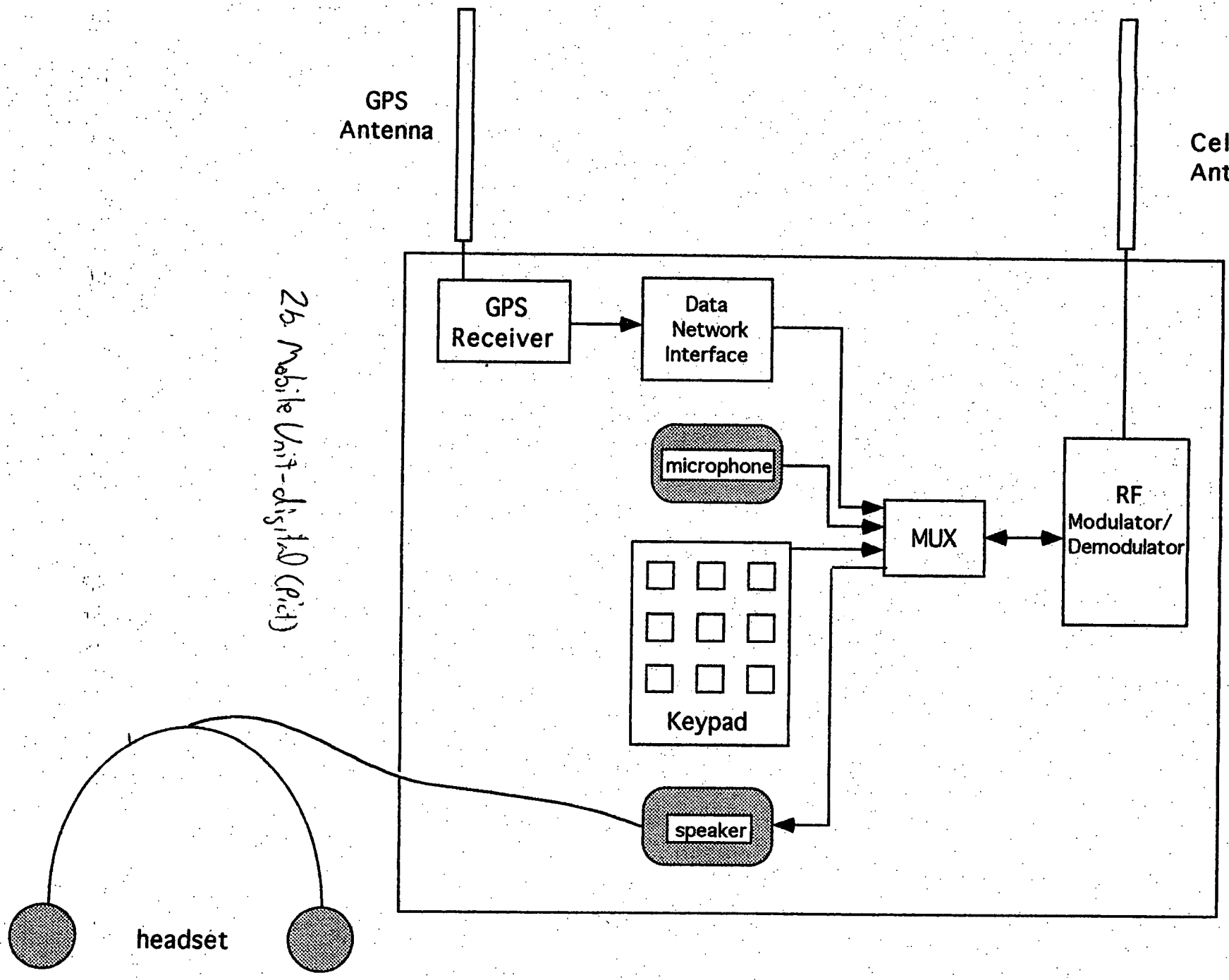

Figure 2b Mobile Unit for Digital Cellular or Satellite Infrastructure (PICT)

Summary of Claims

Summary of Claims

Two Broad Claims
1. Position-based and user-selectable information
2. Position-based information

Four Elements
Positioning System
Wireless Communications Infrastructure
Mobile Unit
Central Site Server

Position Calculation/Determination Alternatives
A. Mobile unit calculates location from received positioning data
B. Mobile unit forwards raw position data to server; server calculates location of mobile unit
C. Mobile unit provides reference signal to positioning system; mobile unit calculates location from received positioning data
D. Mobile unit provides reference signal to positioning system; mobile unit forwards raw position data to server; server calculates location to mobile unit

Wireless Communications Alternatives
A. Analog Cellular
B. Digital Cellular
C. Satellite (Low Earth Orbit and Geosynchronous)

Central Site Server
Digital Private Branch Exchange (PBX), Voice Response Unit (VRU), Server, Storage device

Mobile Unit
A. Analog Cellular (or satellite) mobile unit: Dual Tone MultiFrequency (DTMF)
B. Digital Cellular (or satellite) mobile unit: Data Network Interface, Mux

Search & Rescue (Emergency)
- Mobile unit calculates location from received positioning data
- Central site server contacts operator; transmits location to operator; transfers voice channel to operator

Sequence of Steps
1. User initiates standard voice connection from mobile unit to central site
2. Central site queries user over voice connection for information preferences
3. User selects preferences using DTMF or similar technology
4. User prefences are stored by central site server
5. GPS antenna/receiver of mobile unit receives and processes GPS position
6. Mobile unit transmits GPS position over voice circuit to cetnral site
7. Server at central site selects information content from database depending upon mobile unit's received position and user preferences
8. Central site transmits information over voice connection to mobile unit
9. Mobile unit forwards information to user

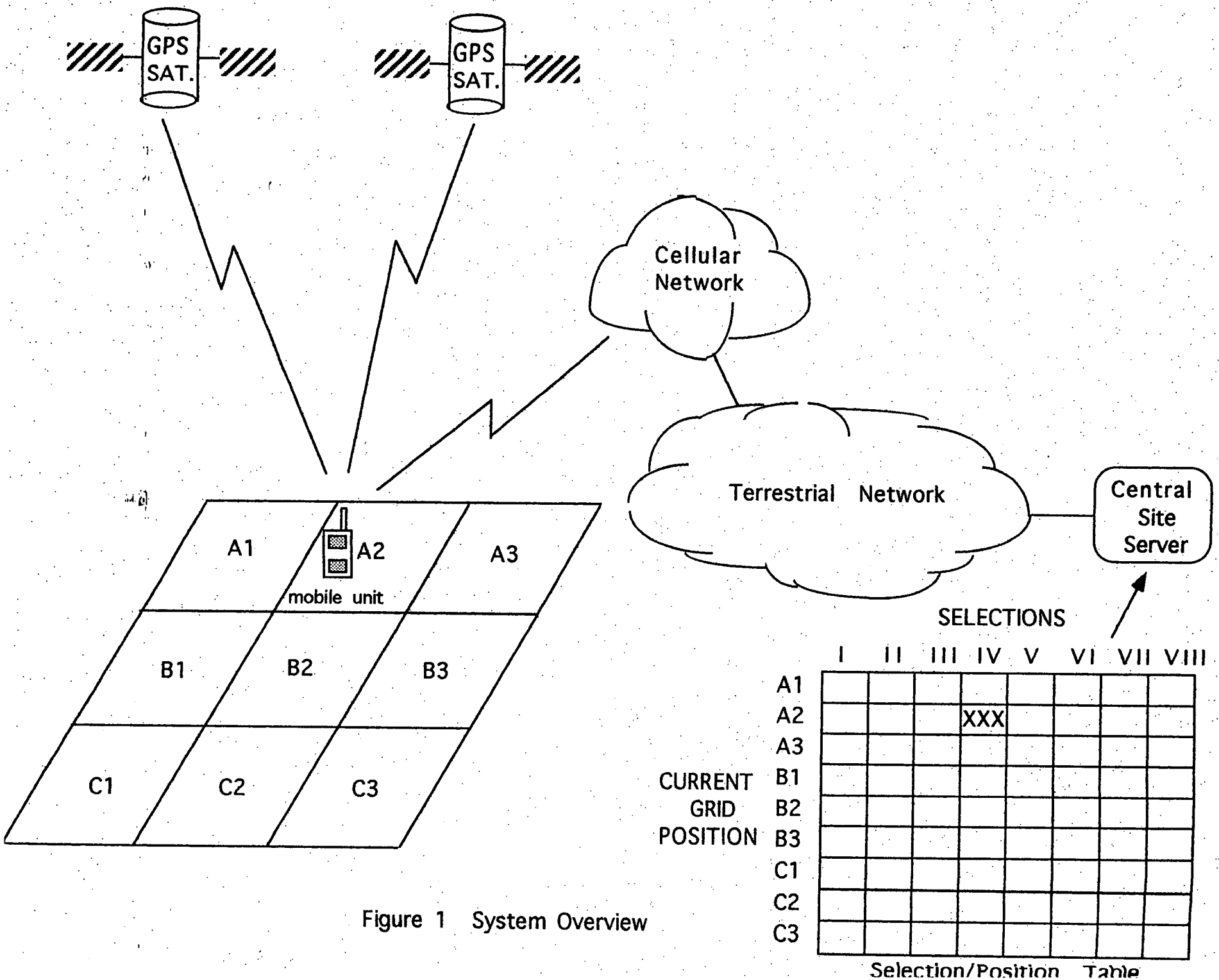

Figure 1 System Overview

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Fig 2A - analog mobile unit

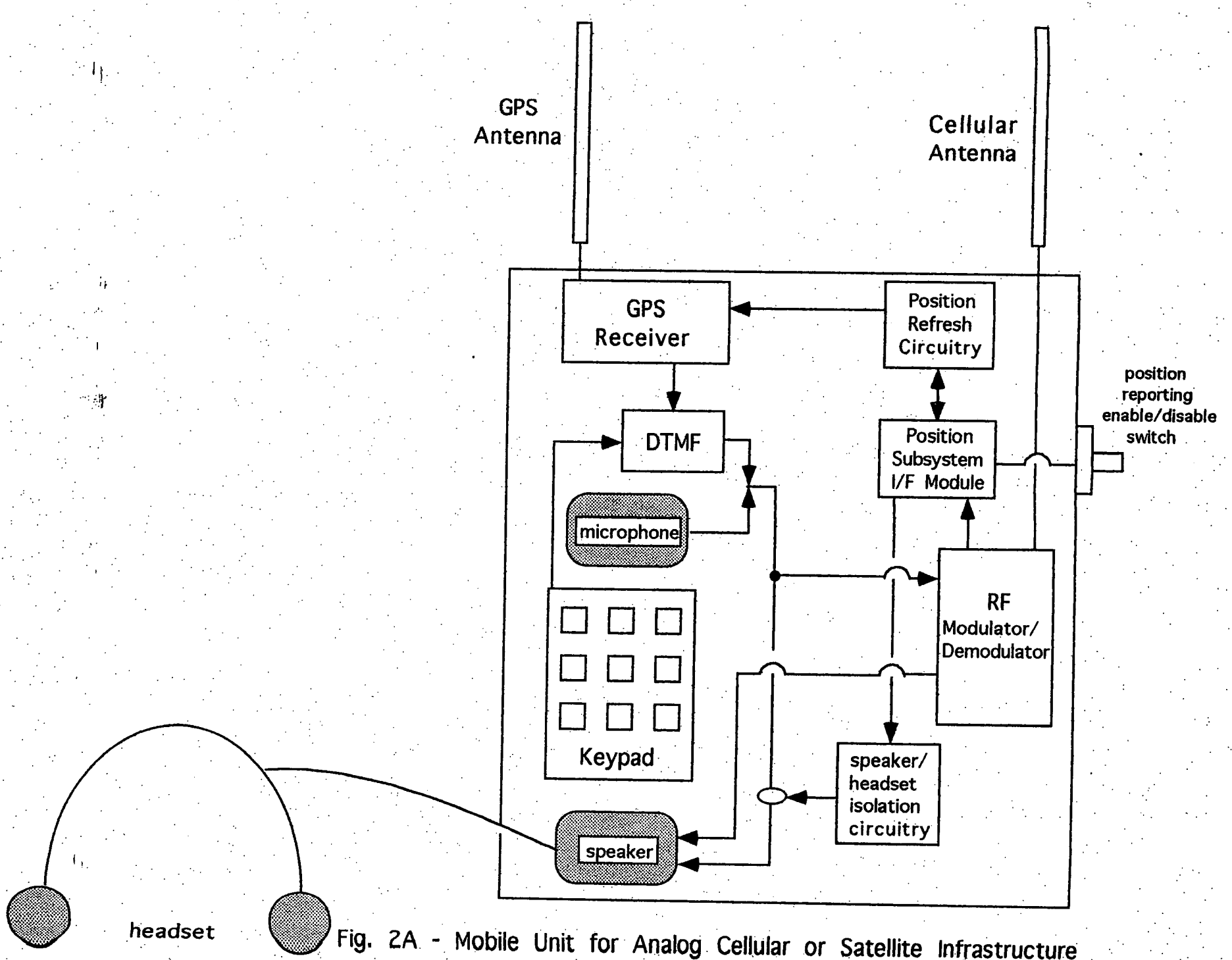


Fig. 2A - Mobile Unit for Analog Cellular or Satellite Infrastructure

Fig 2B digital mobile unit.

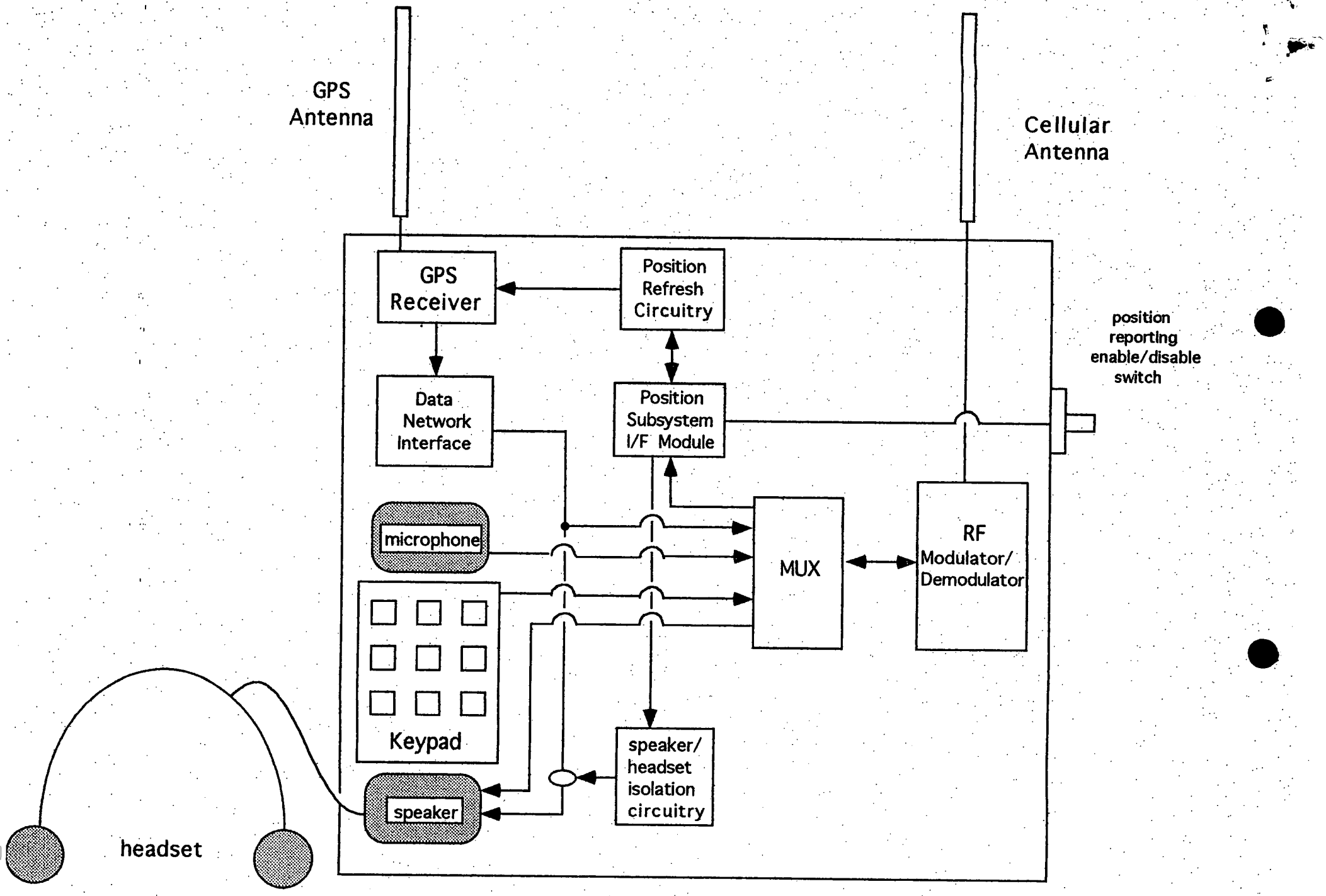


Fig 2B - Mobile Unit for Digital Cellular or LEO Satellite Infrastructure

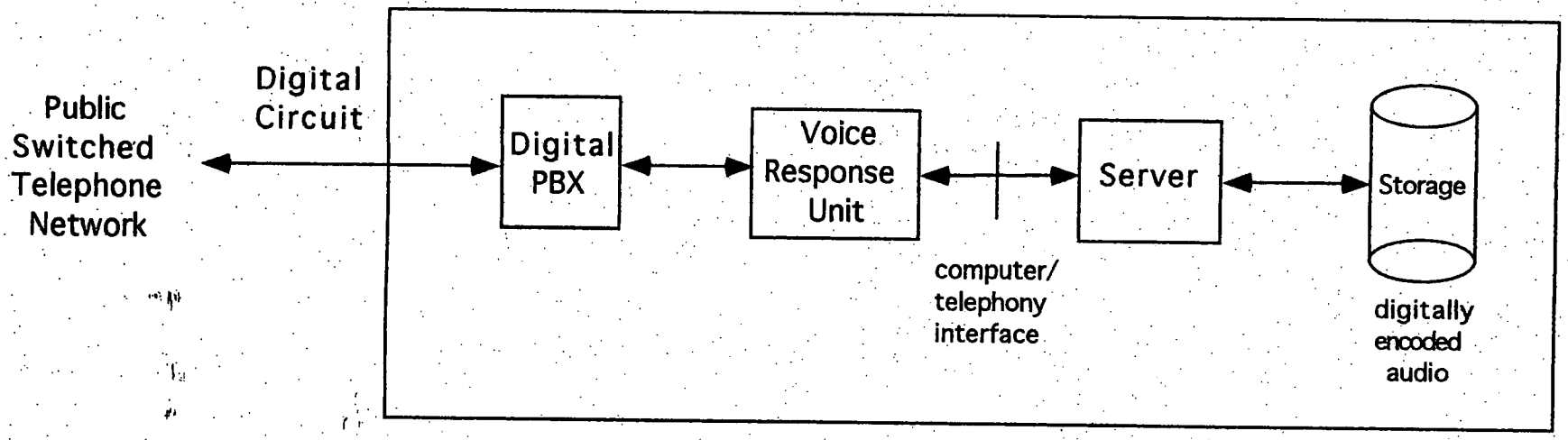
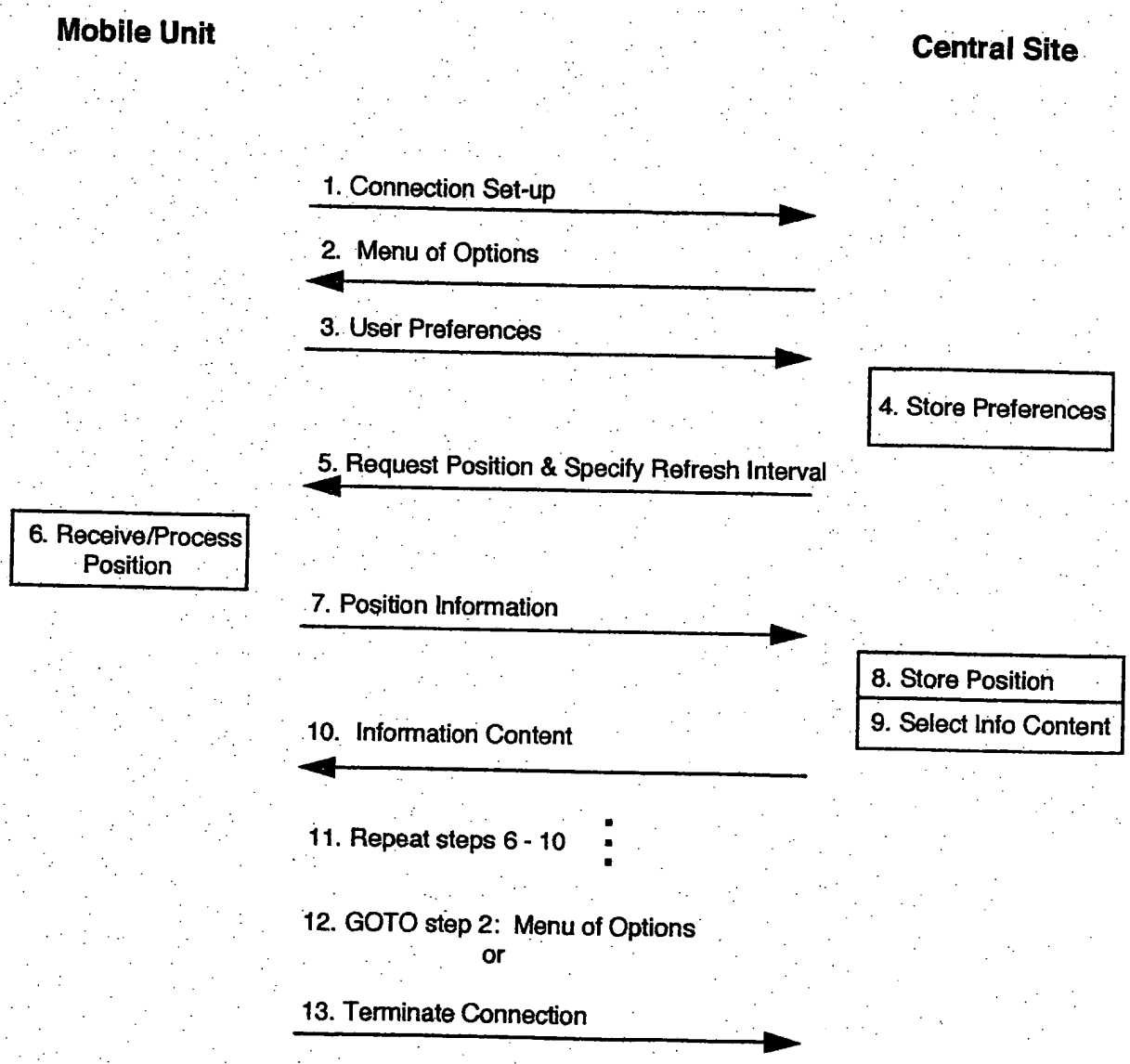


Fig. 3 Central Site Server

Fig 3-Central Site

Flow charts

Preferred Embodiment (analog)



Preferred Embodiment (digital)